LAC LA NONNE MANAGEMENT STUDY

Edmonton Regional Planning
Commission
November, 1981

TABLE OF CONTENTS

Page

I INTRODUCTION 1
- A. Background 1
- B. The Planning Process 2
- C. Components of the Lac La Nonne Management Study 4

II MANAGEMENT STUDY OVERVIEW 5
- A. Biophysical Overview of Lac La Nonne 5
- B. Socio-economic Overview of Lac La Nonne 6

III INFORMATION ANALYSIS AND INTERPRETATION 8
- A. Biophysical Analysis and Interpretation 8
  1. Lake Water Quality 8
  2. Groundwater Availability and Quality 14
  3. Vegetation and Wildlife 18
  4. Soils Analysis for Future Land Use 22
  5. Arable Soils 26
- B. Socio-economic Analysis and Interpretation 30
  1. Questionnaire Information 30
  2. Public Perceptions 31
  3. Land Use Analysis 38
  4. Municipal Financing 53
  5. Existing Plans, Policies and By-laws 55
  6. Recreation Demand and Future Development 59

IV MANAGEMENT STUDY CONCLUSIONS AND DEVELOPMENT CAPACITY 70
- A. Introduction 70
- B. Biophysical Conclusions 70
- C. Socio-economic Conclusions 72

V EVALUATION AND ASSESSMENT OF MANAGEMENT STUDY AND ITS CONCLUSIONS 76
- A. Management Goals and Objectives 76
- B. Development Capacity 78
- C. Important Issues and Other Factors that Influence the Formulation of a Plan 82

TABLE OF CONTENTS (cont'd.)

Page

Appendix A - Lac La Nonne Questionnaires 83

Appendix B - Lac La Nonne Public Information Exchange Meetings Report 98

Appendix C - User Day Calculations 106

Acknowledgements 107

LIST OF FIGURES

		Page
FIGURE 1	Lac La Nonne Management Plan Planning Process	3
FIGURE 2	Lac La Nonne Management Study Components	4
FIGURE 3	Trophic Comparison of Selected Alberta Lakes	10
FIGURE 4	Incorporation of Soil Information	23
FIGURE 5	Soils Overlay Mapping Procedure	24
FIGURE 6	Lac La Nonne Subdivision History	39
FIGURE 7	Boating Activities at Lac La Nonne, July 20, 1980 ...	65
FIGURE 8	Peak Boating Activity at Lac La Nonne, July 20, 1980	65

LIST OF MAPS

		After Page
MAP 1	Regional Setting	1
MAP 2	Drainage Basin	8
MAP 3	Bathymetry	9
MAP 4	Water Wells	15
MAP 5	Vegetation and Water Erosion Hazard	18
MAP 6	C.L.I. Capability for Ungulates, Waterfowl, Sportfish .	19
MAP 7	Single Family Dwelling Limitations	25
MAP 8	On-site Sewage Limitations	25
MAP 9	Residential Development Potential	25
MAP 10	Recreational Limitations	25
MAP 11	Recreational Development Potential	25
MAP 12	C.L.I. Soil Capability for Agriculture and Farmland Assessment	29
MAP 13	Lac La Nonne Existing Land Use	38
MAP 14	Lac La Nonne Boating Activity	65
MAP 15	Land Use Potential	79

LIST OF TABLES

Page

TABLE 1 Lac La Nonne Hydrology Data 9

TABLE 2 Estimated Phosphorus Supply to Lac La Nonne 12

TABLE 3 Drinking Water Quality Standards Used in the Lac La Nonne Area 17

TABLE 4 Limiting Soil Properties and Hazards for Selected Uses in the Lac La Nonne Planning Area 25

TABLE 5 Farmland Assessment Classes for Arable Land 26

TABLE 6 C.L.I. Soil Capability for Agricultural Class System 27

TABLE 7 C.L.I. Soil Capability for Agriculture Subclass Limitations 28

TABLE 8 A Comparison of C.L.I. Soil Capability for Agriculture Classes and Farmland Assessment Productivity Ratings 29

TABLE 9 Landowner Issues at Lac La Nonne 32

TABLE 10 Activities by Zone at Lac La Nonne 35

TABLE 11 Lake and Site Problems by Zone at Lac La Nonne 36

TABLE 12 Roads, Traffic and Property Use Problems by Zone at Lac La Nonne 37

TABLE 13 Subdivided Lots by Zone - Lac La Nonne Planning Area 41

TABLE 14 Available Shoreline Reserve for Future Backshore Development by Zone 42

TABLE 15 Existing and Potential Use of the Lac La Nonne Planning Area 45

TABLE 16 Existing Plans, Policies, and By-laws 56

TABLE 17 Long Term Plans by Zone at Lac La Nonne 60

TABLE 18 Management Proposals by Zone at Lac La Nonne 61

TABLE 19 Background Information for Boating Calculations 62

TABLE 20 Lake Surface Boating Use by Zone at Lac La Nonne 67

TABLE 21 Summary of Lac La Nonne Development Limitations 80

TABLE 22 Lac La Nonne's Development Capacity as Expressed by the Plan Alternatives 82

I INTRODUCTION

Lac La Nonne is situated in the Province of Alberta, approximately 96 kilometres northwest of the City of Edmonton. It is located on the boundary of the Counties of Lac Ste. Anne and Barrhead (see Maps 1 and 2).

The surface area of the lake is 1,226 hectares or 4.7 square miles. Compared to other lakes in the vicinity, Lac La Nonne is a deep lake with a maximum depth of 19.8 metres. Since 1947, when the first resort cottage subdivision was registered, Lac La Nonne has continued to experience subdivision development pressure. Presently, there are a total of 678 subdivided lots and 537 commercial recreation sites within the planning area.

In response to the growing number of subdivision applications, the increased use of the area by cottagers who have winterized their cottages, and the intensified use of the lake by the public at large, the Provincial Government regulated the shoreland of Lac La Nonne. Since August of 1977, development, involving a surface disturbance such as roadways or multi-parcel subdivisions, has been restricted by the Minister of the Environment to allow for the preparation of a Lake Management Plan.

A. Background

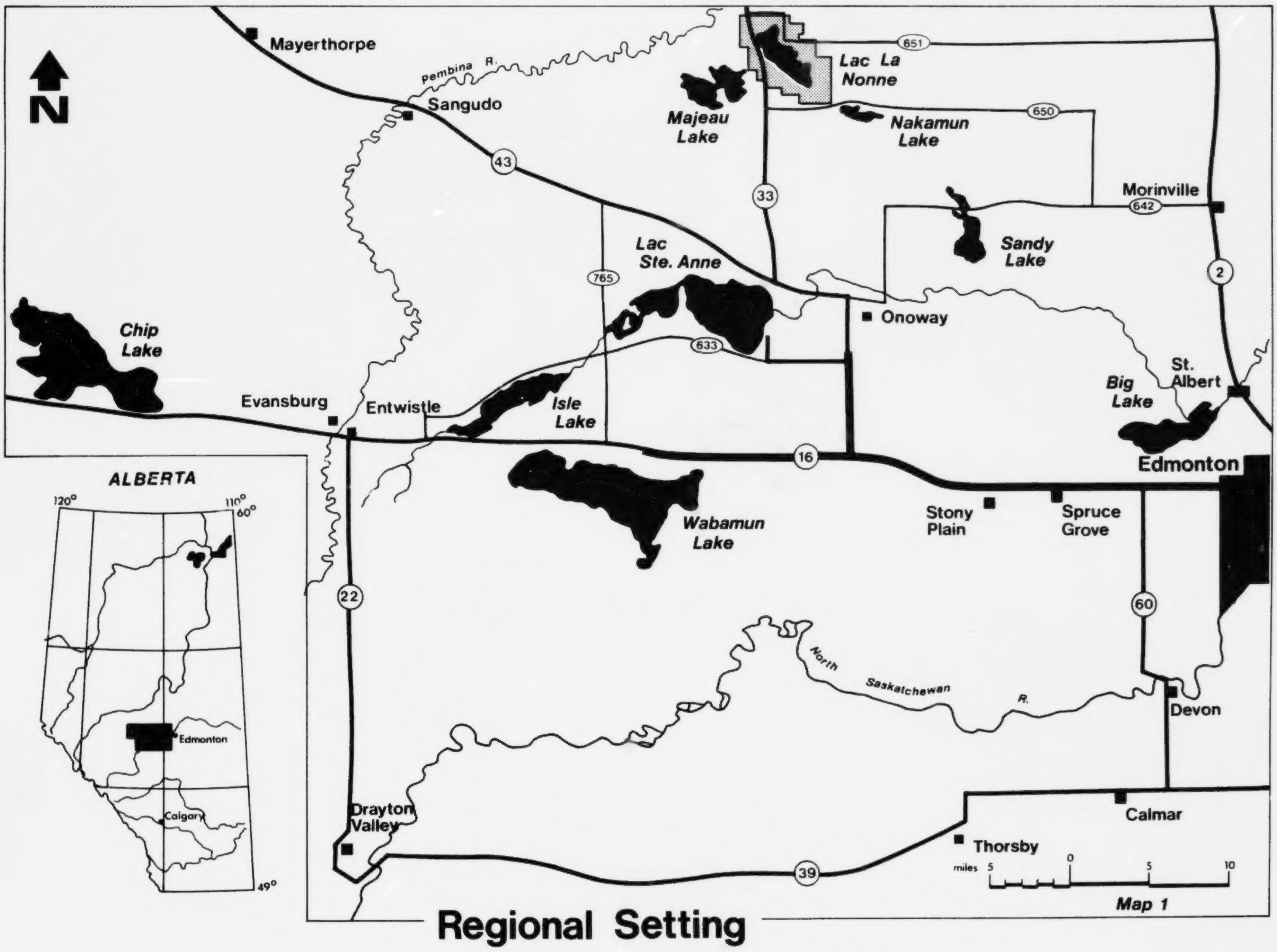
The preparation of a Lake Management Plan for Lac La Nonne can be summarized in relation to the following major events.

1. Shoreland Regulated by the Province of Alberta

In August of 1977, the Provincial Legislature passed Order in Council No. 850/77. The Order in Council established the Regulated Lake Shoreland Development Operation Regulations pursuant to the Land Surface Conservation and Reclamation Act. Through this Act, the Alberta Government designated the lake shorelands around fifteen Alberta lakes as regulated, pending the completion of a Lake Management Plan and adoption of a Land Use By-law for each regulated lake. Six of the fifteen regulated lakes are located within the Edmonton Regional Planning Commission planning region. Lac La Nonne is one of these lakes. The regulated boundary of Lac La Nonne is shown on Map 3.

2. Alberta Planning Board Guidelines Published and Budget Approved

After the publication of Alberta Planning Board Guidelines for Use In Preparing Lake Shoreland Management Plans (June 1978) and the Board's approval of a budget to undertake the preparation of lake management plans (January 1979), the Edmonton Regional Planning Commission


N
Mayerthorpe
Pembina R.
Sangudo
43
Lac La Nonne
651
650
Majeau Lake
Nakamun Lake
Morinville
642
2
33
Sandy Lake
Lac Ste. Anne
765
Onoway
Chip Lake
633
St. Albert
Big Lake
Evansburg
Entwistle
Isle Lake
16
Edmonton
ALBERTA
120°
110°
60°
Edmonton
Calgary
49°
Wabamun Lake
Stony Plain
Spruce Grove
22
60
North Saskatchewan R.
Devon
Drayton Valley
Calmar
Thorsby
39
miles 5 0 5 10

Map 1

Regional Setting

officially began the Lake Management Plan Project. The Lac La Nonne Management Plan Project began in the spring of 1980. Alberta Municipal Affairs agreed to assist in the preparation of a Lake Management Plan, since the northern shore of the lake is within the County of Barrhead, which is not part of the Edmonton Regional Planning Commission.

3. Commencement of the Lac La Nonne Management Plan

In June of 1980, the Edmonton Regional Planning Commission, Alberta Municipal Affairs, and the Counties of Lac Ste. Anne and Barrhead initiated the program.

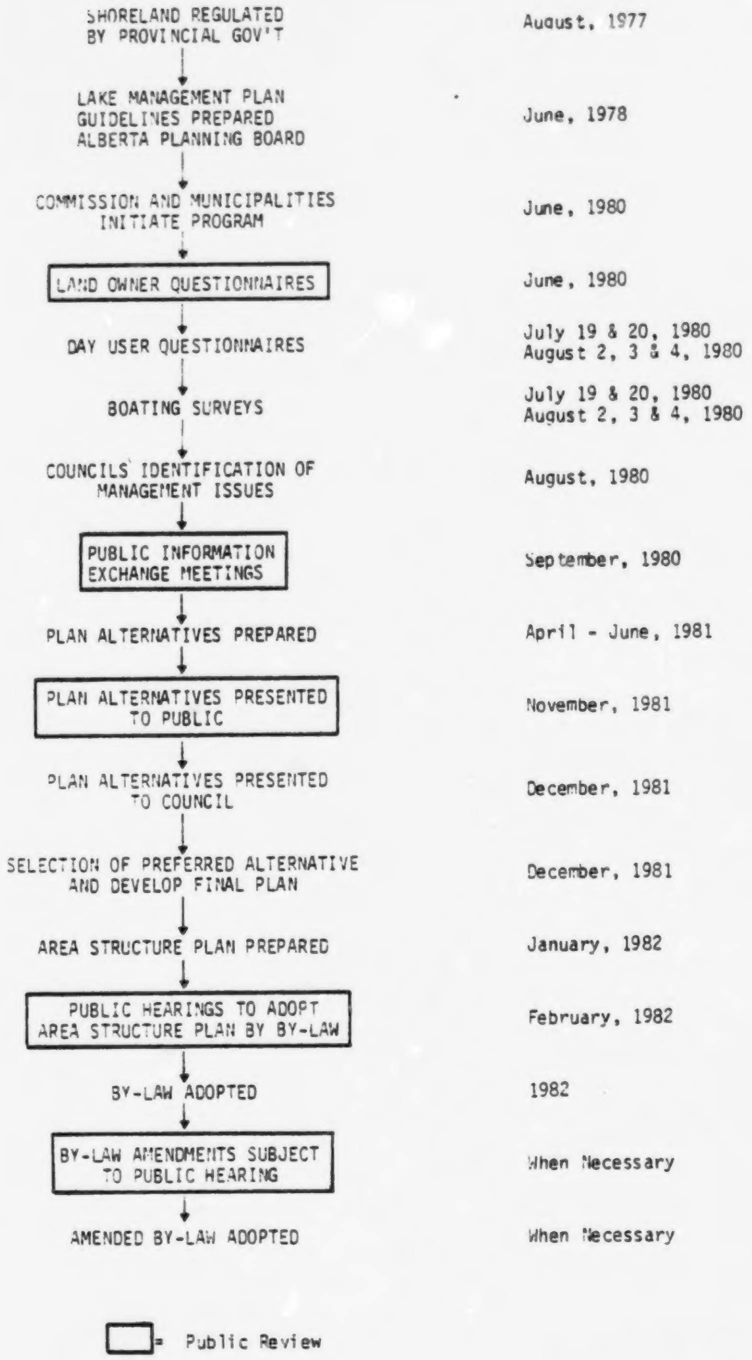
B. The Planning Process

The following flow chart outlines the basic steps involved in the Lac La Nonne Management Planning Process (see Figure 1). The process is designed to provide opportunities for public participation and review before major decisions are made by the two municipalities.

The first major step in the planning process was the preparation of the initial report: Lac La Nonne, Background Information and Management Issues. The report was reviewed by the two municipal councils and then distributed to all affected landowners. Two public information exchange meetings were held during the fall of 1980. At these meetings the public identified issues, concerns and problems; outlined the positive aspects or virtues of the area; and, assisted in refining the management issues that should be addressed in a final plan. This report, The Lac La Nonne Management Study, has evolved from a more detailed analysis and interpretation of information, and from the overall guidance provided by these initial public and council meetings.

The Lac La Nonne Management Study provides the necessary background and support information for the Lac La Nonne Management Plan Alternatives, and the eventual final plan. The publication of the management study and the plan alternatives documents constitutes the second major step in the planning process. These documents will be subject to public and council review before a final plan for the lake and shoreland is formulated. Adoption of a final plan, the last major step in the overall process, will also involve the public in the form of an official public hearing. Municipal Councils will then proceed with the necessary steps to adopt the final plan by by-law.

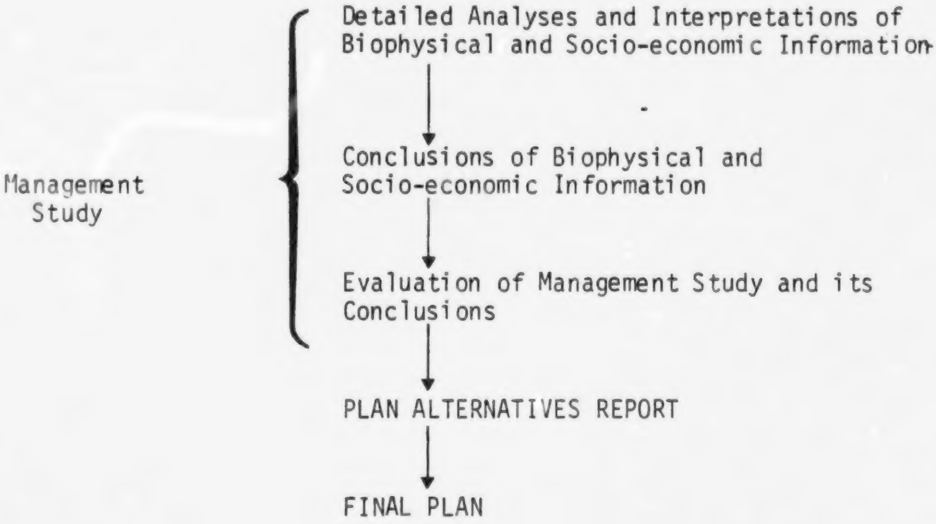
FIGURE I: LAC LA NONNE MANAGEMENT PLANNING PROCESS


SHORELAND REGULATED BY PROVINCIAL GOV'T
August, 1977
LAKE MANAGEMENT PLAN GUIDELINES PREPARED ALBERTA PLANNING BOARD
June, 1978
COMMISSION AND MUNICIPALITIES INITIATE PROGRAM
June, 1980
LAND OWNER QUESTIONNAIRES
June, 1980
DAY USER QUESTIONNAIRES
July 19 & 20, 1980
August 2, 3 & 4, 1980
BOATING SURVEYS
July 19 & 20, 1980
August 2, 3 & 4, 1980
COUNCILS' IDENTIFICATION OF MANAGEMENT ISSUES
August, 1980
PUBLIC INFORMATION EXCHANGE MEETINGS
September, 1980
PLAN ALTERNATIVES PREPARED
April - June, 1981
PLAN ALTERNATIVES PRESENTED TO PUBLIC
November, 1981
PLAN ALTERNATIVES PRESENTED TO COUNCIL
December, 1981
SELECTION OF PREFERRED ALTERNATIVE AND DEVELOP FINAL PLAN
December, 1981
AREA STRUCTURE PLAN PREPARED
January, 1982
PUBLIC HEARINGS TO ADOPT AREA STRUCTURE PLAN BY BY-LAW
February, 1982
BY-LAW ADOPTED
1982
BY-LAW AMENDMENTS SUBJECT TO PUBLIC HEARING
When Necessary
AMENDED BY-LAW ADOPTED
When Necessary
= Public Review

C. Components of the Lac La Nonne Management Study

The Lac La Nonne Management Study contains an analysis and an interpretation of biophysical and socio-economic information. The information contained in the Management Study is designed to be used as ready reference material. The Plan Alternatives for Lac La Nonne and the eventual final plan are, and will be, primarily based upon the information analyses and interpretations contained in the Management Study. Figure 2 outlines the primary components of the Lac La Nonne Management Study.

FIGURE 2 LAC LA NONNE MANAGEMENT STUDY COMPONENTS


Detailed Analyses and Interpretations of Biophysical and Socio-economic Information
Management Study
Conclusions of Biophysical and Socio-economic Information
Evaluation of Management Study and its Conclusions
PLAN ALTERNATIVES REPORT
FINAL PLAN

II MANAGEMENT STUDY OVERVIEW

The background information used to develop the Lac La Nonne Management Study has been divided into two major areas - biophysical and socio-economic. The following overview has been developed to introduce the reader to this information and to provide a fuller understanding of the detailed analyses and interpretations contained in Section III.

A. Biophysical Overview of Lac La Nonne

Both the biological and physical environments have been studied at the lake. Information has been gathered on the lake and topography, climate, geology, soils, groundwater, vegetation, wildlife and non-renewable resources. This information has then been assessed in order to determine the capacity of the lake and shoreland to withstand change or disruption.

Lac La Nonne is part of the Pembina River system, a major sub-basin of the Athabasca River basin. Run-off from 20,000 hectares of land flows into the lake. In addition, inflow from Nakamun and Majeau Lakes occurs intermittently during periods of high run-off. MacDonald Creek, located on the northeast end of Lac La Nonne, drains north to the Pembina River.

Local relief in the planning area is 70 metres with the highest elevation of 720 masl in the southwestern portion of the planning area, and the lowest elevation of 650 masl on the eastern side of Lac La Nonne. The topography varies from relatively level terrain to areas that are strongly rolling.

Fluctuations in lake levels seem to be less than 1 metre, according to the intermittent records that have been kept since the late 1930's. The landowner questionnaires appear to support this assumption as very few people complain about flooding problems at Lac La Nonne.

The general climate of the Lac La Nonne area is characterized by warm summers, cold winters and very short, transitional spring and autumn periods. The average frost-free period ranges from 75-90 days. Total precipitation averages 47 centimeters per year, with 70-75 percent falling during the summer season. Predominant wind direction alternates between south and northwest, the latter prevailing in summer. Climatic conditions vary locally and have a major influence on agricultural productivity and recreational activities.

Geologically, the Lac La Nonne area is composed of bentonitic, shale, sandstone and mixed coal seam bedrock, that is covered by a glacial till veneer. The till, composed of sand, silt and clay with pebbles, cobbles and boulders, was deposited 10,000 years ago by retreating continental ice sheets. Both the till and the bedrock have influenced soil development in the form of parent material. Generally, the area is characterized by moderate to poor agricultural soils that have a CLI for agriculture rating of class 3 or 4 in combination with areas of classes 5 and 6. Significant areas of moss and sedge peat bogs are also found next to Lac La Nonne.

The limited information available on local groundwater, indicates that good yields can be expected from bedrock aquifers. Information on quality indicates that some treatment for sodium, bicarbonates or iron may be required, but generally speaking, the groundwater appears acceptable.

Forest cover is a typical boreal forest with aspen and balsam poplar stands mixed with areas of white and black spruce and birch. The remaining vegetation cover consists of bulrush, sedge/cattail and willow along the shoreline and wet meadow and grassland on backshore areas. The reduced marsh edge along the shore has made the area poor for the production and staging of waterfowl. In addition, the lack of permanent sloughs distributed throughout the area has reduced its waterfowl production capability. White-tailed deer are the main ungulates found in the vicinity with evidence of mule deer and moose. Elk are rarely seen. The occasional black bear may also be sighted in the area, but this is a rare occurrence.

Lac La Nonne is a good fishing lake. Northern Pike, walleye, and yellow perch are the most common species. Commercial fishing, primarily for tullibee, has not been allowed since February of 1975, and there appears little probability of it being allowed within the immediate future. Area residents have indicated that their most popular activity in both summer and winter is fishing.

Deposits of coal, oil and gas are present in the area, but do not appear to be of significant quantity to warrant exploitation at this time. Aggregate reserves of sand and gravel can also be located in the area, but are not being extracted on a large scale basis.

B. Socio-economic Overview of Lac La Nonne

In addition to the foregoing biophysical factors affecting Lac La Nonne, many social, political and economic parameters influence the lake's future. The majority of the social issues have been identified through the public meeting process and by responses to landowner and lake user questionnaires. Political influences have involved the legislative mandate of the local municipalities, Regional Planning Commission and the Provincial Government. Economic factors concern municipal finances, the pattern and type of existing land use, transportation and municipal services and utilities, and future demands for recreational, residential and agricultural land uses. All of these factors, which have been organized under the general heading socio-economic, affect Lac La Nonne and play an important role in determining the future use of the lake and its surrounding shoreland.

Public perceptions, identified through the public meetings and questionnaires, have resulted in a priority listing of issues that should be addressed in future plans. However, these issues have to be assessed according to their comparative importance. The identified issues reflect the feelings of the majority of the people at Lac La Nonne - the resort cottage owner. On the basis of land area, however, the resort cottage owner is comparatively insignificant. The largest land holdings in the planning area are primarily owned by local farmers. Both viewpoints are equally important. On the basis of population, the resort cottage voice is very strong and important, but on the basis of land area (areas that have the most potential for future change) the voice of the local farmer, although not as strong, is equally important. The future plans affecting Lac La Nonne and its shoreland must consider as many influencing factors as possible. The views expressed by the majority of the population have to be weighed against those expressed by the owners of the largest areas of land. This holistic viewpoint is important for understanding the more detailed analyses and interpretations of this information.

Political influences related to the legislative mandates of the local municipalities, Regional Planning Commission, Alberta Municipal Affairs and other Provincial Government departments and agencies, have been identified. The ultimate success of the final plan, however, seems to be the primary responsibility of the local municipalities. Through adoption of a final plan by by-law, the local municipalities become responsible for the implementation and administration of the final plan. Although the final plan may include recommendations and policies that can only be implemented at the Provincial Government level, the main portions of the plan remain the responsibility of local municipalities.

Economics also affect planning at Lac La Nonne. Municipal taxation and financing allow for the efficient administration and operation of the municipality, within specific monetary limits. A lake management study and eventual final plan must be sensitive to the monetary constraints of the municipalities. Future plans have to make provision for the availability of existing utility and transportation services. Population growth trends, changes in land use to permanent residency, and increased recreational use of the area also influence final plan formulation.

Existing economic realities have to be assessed. It is easy to point out that a change in Provincial policies or National or Global events may drastically alter the economic assumptions made during plan preparation.

In summary, there are many biophysical and socio-economic factors influencing the formulation of a final lake management plan for Lac La Nonne. It is anticipated that the above overview has provided sufficient background information for the more detailed analyses and interpretations that follow.

III INFORMATION ANALYSIS AND INTERPRETATION

A. Biophysical Analysis and Interpretation

1. Lake Water Quality

The Water Quality Control Branch of Alberta Environment undertook a two-year limnological study of Lac La Nonne in 1978/79. The purpose of that study was to define the physical chemical characteristics and the trophic status of the lake. Recommendations were made on methods to mitigate man's impact on the lake. Results were published in a report entitled Lac La Nonne Water Quality Report*. This section summarizes the results of that report, with emphasis on those of interest to the lake management plan.

Trophic state refers to a lake's ability to produce algae and aquatic plants. Lakes span a range of trophic states from clear oligotrophic ones, with low algal populations and few rooted shoreline plants, to eutrophic ones with weed development and low water clarity due to extensive algal blooms. Mesotrophic lakes are intermediate between these two extremes. Recreational users usually equate good water quality with oligotrophic or mesotrophic conditions.

Transition from oligotrophy to eutrophy is a natural process resulting from a gradual increase in the essential nutrient content of a lake. Nutrients enter a lake primarily in runoff from the surrounding watershed, as well as in dustfall and precipitation. In an undisturbed system, the rate of eutrophication is usually extremely slow, however, in recent times watershed disturbance due to human development has often increased the export of nutrients from a lake's surroundings and subsequently accelerated the process.

a) Physical Chemical Characteristics

Basic physical chemical characteristics were investigated to determine the effect on the trophic state of the lake. Hydrology data are given in Table 1. The lake is moderately shallow, and has a lengthy water residence time of 6.5 years. Only 38% of the watershed drains directly into the lake. The remainder, 62%, drains first into either Nakamun Lake or Majeau Lake. Flows from those lakes to Lac La Nonne occur only during periods of high flow such as during spring snowmelt or flood periods. The Lac La Nonne drainage basin is shown on Map 2.

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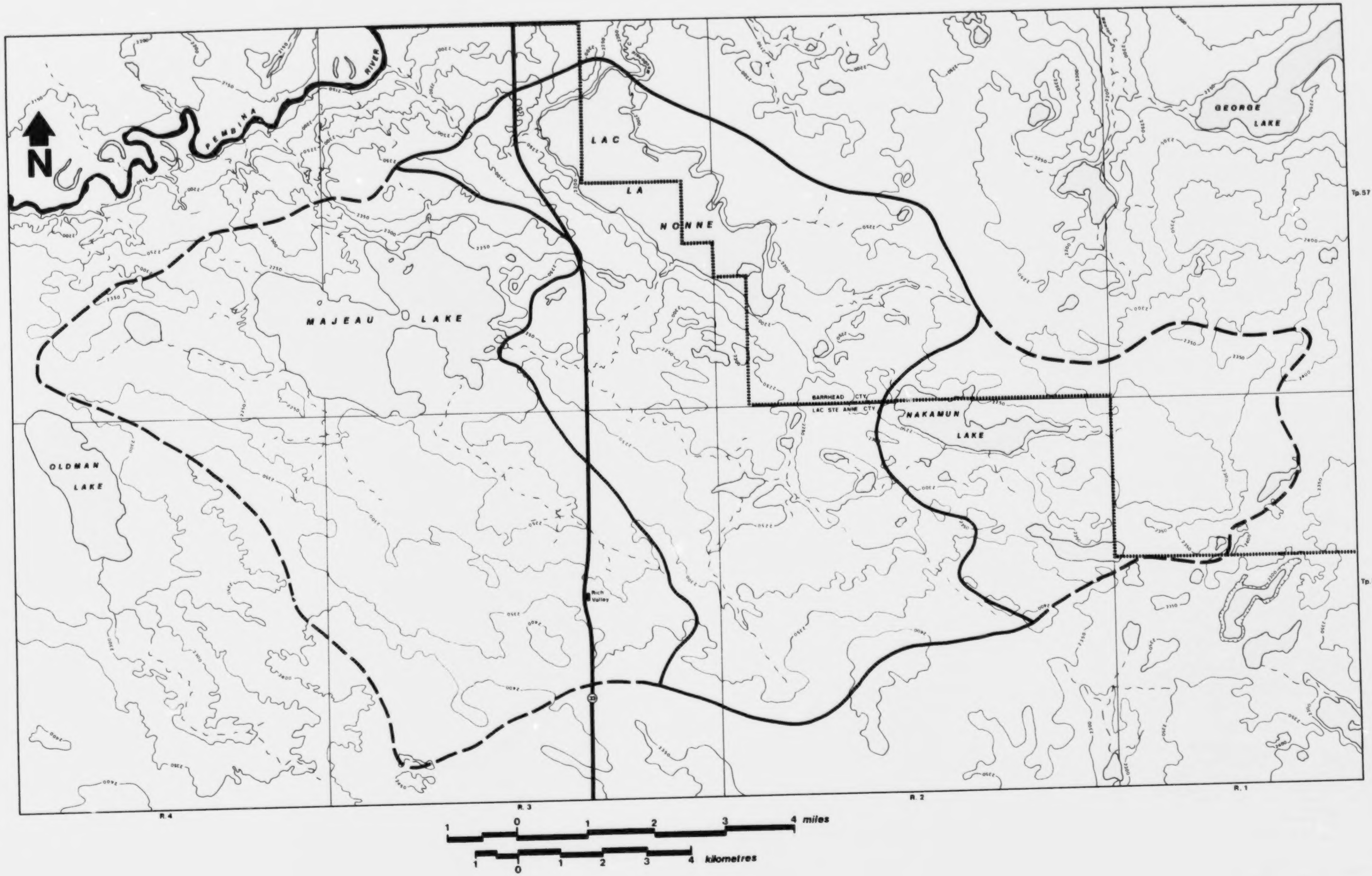
* Alberta Environment Water Quality Control Branch, Lac La Nonne Water Quality Report, November 1980.


N
PEMBINA RIVER
LAC LA NONNE
GEORGE LAKE
MAJEAU LAKE
OLDMAN LAKE
NAKAMUN LAKE
BARRHEAD CTY
LAC STE ANNE CTY
Rich Valley
Tp.57
Tp.56
R.4
R.3
R.2
R.1
1 0 1 2 3 4 miles
1 0 1 2 3 4 kilometres
Perennial
Seasonal

Lac La Nonne Drainage Area

Map 2

The deepest areas of the lake stratify thermally each summer. This is a natural process which effectively creates two layers of water - a warm, well oxygenated layer near the surface (epilimnion), and a cool, poorly oxygenated layer near the bottom (hypolimnion).

The hypolimnion will undergo oxygen depletion due to decomposition of dead plants and animal material. In Lac La Nonne, this process results in complete depletion of oxygen from the hypolimnion during July and August and again in late winter. In summer, the oxygen levels normally increase from zero at the bottom to at least 9 or 10 ppm at the surface. In winter, concentrations increase from zero to 5 or 6 ppm immediately under the ice. This is approaching the danger level for fish survival. After icemelt in the spring and again in the fall, low surface water temperatures and higher winds cause the lake water to circulate completely. This circulation also causes enrichment of dissolved oxygen in the lake water. Lake bathymetry is shown on Map 3.

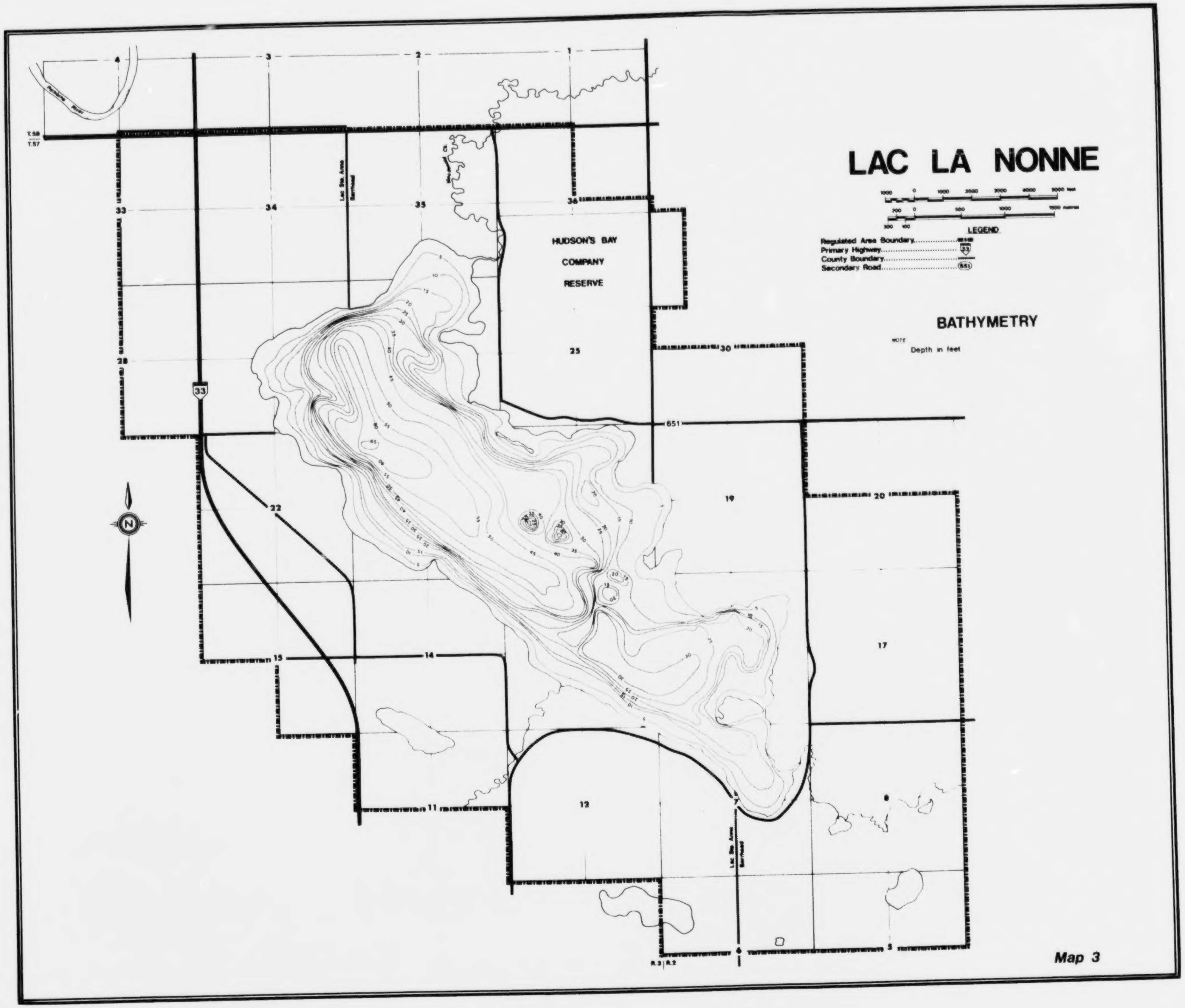
TABLE 1

LAC LA NONNE HYDROLOGY DATA

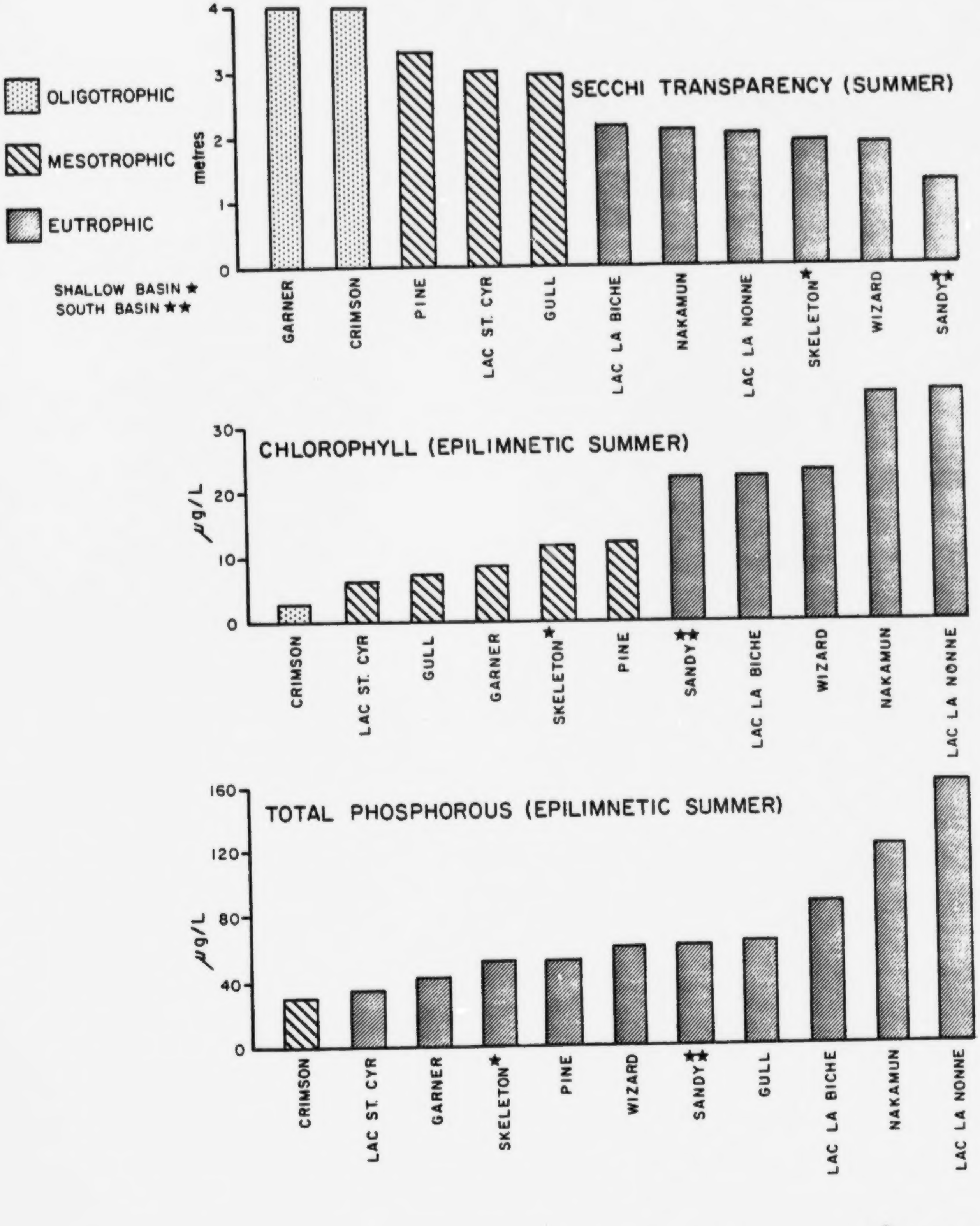
Surface drainage	290.05 km^2	(112 mi^2)
Lake area	12.28 km^2	(4.74 mi^2)
Volume	92,956,000 m^3	(75,361 ac ft)
Maximum depth	20 m	(66 ft)
Mean depth	7.57 m	(24.8 ft)
Average annual inflow to lake	14,241,000 m^3	(11,545 ac ft)
Average annual outflow	6,399,000 m^3	(5,188 ac ft)
Residence time	6.53 years	

b) Trophic Status

The trophic status of Lac La Nonne and other lakes has been defined using several parameters. Comparative results of three of these parameters including amount of algae growth are shown in Figure 3. One parameter is secchi transparency, a measure of water clarity which is in turn a major indicator of water quality. It shows that Lac La Nonne is eutrophic. A second parameter is chlorophyll, the green photosynthetic pigment of algae. The greater the volume of algae in the sample, the higher the chlorophyll levels. The third parameter is total phosphorus, one of the major nutrients for algal growth. Higher levels of phosphorus generally allow higher levels of algal growth. In Lac La Nonne, other factors such as light and temperature, or nitrogen may also be controlling growth.


LAC LA NONNE
1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
BATHYMETRY
NOTE
Depth in feet
HUDSON'S BAY
COMPANY
RESERVE
T.58
T.57
R.3 | R.2
33
651
4
3
2
1
33
34
35
36
28
25
30
22
19
20
15
14
17
11
12
8
6
5

Map 3



TROPHIC COMPARISON OF SELECTED ALBERTA LAKES

FIGURE 3

Alberta
ENVIRONMENT
Pollution Control Division
Water Quality Control Branch

In mid-summer, nitrogen becomes a limiting factor to growth of many algae. Only blue-green algae can fix their own nitrogen supply from the air, thereby circumventing any shortage problems and producing bloom conditions. On the basis of all three parameters compared in Figure 3, Lac La Nonne rates as one of the most eutrophic.

c) Phosphorus Loading

Limnologists consider phosphorus to be the nutrient most often in short supply and therefore to be the factor that ultimately controls the quantity of algae produced during a particular growing season. Even though phosphorus may not be the only nutrient controlling growth, it was considered appropriate to investigate Lac La Nonne's phosphorus budget for two reasons:

1) it will assist in predicting possible change in the lake's trophic status in recent years; and
2) phosphorus is still the major factor determining algal growth which can reasonably be controlled.

The field measurements of various parameters over the two years yielded information concerning the lake alone. No information was collected regarding sources of phosphorus from the watershed as sampling all inputs and outputs from the system is extremely expensive and time consuming. An estimate of phosphorus loading was, therefore, done using a mathematical model. The model simply assumes a standard phosphorus loading (export coefficient) from individual land uses. For example, forested land yields, on average, 0.1 kg/ha/yr phosphorus while cleared agricultural land yields 0.5 kg/ha/yr. Urban areas yield 1.0 kg/ha/yr. Results of this modelling for Lac La Nonne are given in Table 2.

Surface runoff produces the largest amount of the phosphorus, 58%, with cleared land producing 46% alone. Nine percent is from forested land. Although the phosphorus export coefficient for urban lands is twice that of agricultural lands, the small area involved means that it accounts for less than 3% of the total input.

Majeau and Nakamun Lakes act as nutrient "sinks", retaining over 70% of the phosphorus that flows into them. The amount of phosphorus that flows from those lakes to Lac La Nonne has, therefore, been reduced substantially. Still, the calculations indicate 19% of the phosphorus loading is from Majeau Lake and 9% is from Nakamun Lake.

Precipitation and dustfall account for 6% of the total.

The sewage input factor of 8% is likely a considerable overestimation because it reflects the worst possible situation. It assumes that all phosphorus generated as sewage and grey water was discharged directly into the lake. In actuality, some phosphorus is filtered out by the soil, and some sewage is taken out of the watershed entirely when it is trucked to sewage lagoons.

TABLE 2

ESTIMATED PHOSPHORUS SUPPLY TO LAC LA NONNE*

	Kg/yr	% of Total
Surface Runoff		
Forested Land	537	8.9
Cleared Land	2,770	46.3
Wetlands	0	-
Urban	160	2.7
Input Via Majeau Lake	1,130	18.9
Input Via Nakamun Lake	524	8.8
Precipitation, dustfall	377	6.3
Sewage input from lakeshore residences and commercial developments	484	8.1
TOTAL	5,982	

* Source, Lac La Nonne Water Quality Report.

There is an average five fold increase in phosphorus export when forested land is put into agriculture. The impact this can have is illustrated by some data collected during the 1979 spring runoff period. Phosphorus levels in the creek draining from Majeau Lake into Lac La Nonne increased from 0.270 mg/l at Highway 33 to 0.760 mg/l prior to entering Lac La Nonne. This increase can be attributed to phosphorus inputs from small streams draining the farming area east of Highway 33, in which phosphorus concentrations as high as 4.53 mg/l were detected.

If the watershed were completely undeveloped (simulating the conditions before man's influence), the loading would be reduced to 2239 kg/yr, less than half the current estimated loading of 5982 kg/yr. Using this lower figure in further calculations, it is estimated that Lac La Nonne was still productive in terms of algae and plants before development. It would, however, be closer to the transition zone between oligotrophic and eutrophic lakes.

d) Summary

The limnological information gathered during 1978/79 indicates Lac La Nonne is currently highly eutrophic. This conclusion is based upon the observed development of dense blue-green algal blooms and shoreline weed beds, along with measured values for other trophic indicator parameters such as secchi transparency, chlorophyll and total phosphorus. In relation to other central Alberta lakes, it is one of the most eutrophic studied to date.

The lake is subject to depletion of oxygen in the deeper waters during summer, while during winter, oxygen levels throughout the lake are approaching the danger level for fish populations.

Although nutrient levels may not solely control algal population levels throughout the year, they do ultimately determine the lake's trophic status. The greatest identifiable source of phosphorus, the nutrient of prime concern, is estimated to be runoff from cleared agricultural lands. Inputs from Majeau and Nakamun Lakes are second in importance, with inputs from lakeshore development estimated to be less than 11% of the total.

Based upon nutrient loading relationships, the lake has likely been productive and supported substantial algal and rooted aquatic plant populations for a considerable time period. However, development of Lac La Nonne's watershed has likely caused deterioration of the lake's trophic status in recent times.

e) Water Levels

Water levels at Lac La Nonne have been measured intermittently since 1940. Readings have been taken only a few times per year, however, so the record does not give complete information on lake level fluctuations. From the available information, however, the variation is as follows:

Highest Lake Level	2178.63 ft	July 22, 1971
Lowest Lake Level	2175.88 ft	August 5, 1940
Variation	2.75 ft	

During the late 1930's, low lake levels became a concern of local residents. A weir was constructed in 1939 on Macdonald Creek (the creek draining Lac La Nonne) by Ducks Unlimited at the request of local residents. In 1949, the weir was reconstructed by Ducks Unlimited. The weir was to be operated by local residents and maintained by the provincial government. This weir has almost completely disintegrated now. It has little or no effect on lake levels.

2. Groundwater Availability and Quality

Groundwater can be a limiting factor when subdivision or development is considered for an area. Its availability can limit the number of lots (households) permitted per quarter section. Its quality affects the amount of treatment necessary to make the water palatable and safe to drink. An analysis of these factors was undertaken to determine any development constraints originating from groundwater problems.

a) Geological Influences

Groundwater availability and quality is a direct result of the character of the materials it is drawn from. In the Lac La Nonne area, most wells reach into bedrock, which here is the Wapiti Formation. The Wapiti Formation is of Upper Cretaceous age (65-100 million years before present) and is characterized by extreme variation in character both laterally and vertically. Green (1972) describes it as "grey, feldspathic, clayey sandstone; grey bentonitic mudstone and bentonite; scattered coal beds; nonmarine". There is a high risk, then, of extreme variation in water availability from one well to another over a short distance. Coal or sandstone lenses generally deliver good volumes of water as long as they are large enough. Clay and mudstone lenses are poor aquifers.

The bedrock was eroded in pre-glacial times by rivers. The river valleys gradually filled in with deposits of sands and gravels. These deposits are known generally as Saskatchewan Sands and Gravels. A small pre-glacial valley disects the Lac La Nonne area, but the deposits are relatively thin and few wells finish in them. Water availability can be extremely good from the Saskatchewan Sands and Gravels. Apparently in this area, however, it is an unreliable source.

Overlying the bedrock and Saskatchewan Sands and Gravels is glacial till, a heterogeneous mixture of sand, gravel, and clay of all sizes deposited during the last Ice Age (10,000 years before present). The till has accumulated in varying amounts depending on the underlying surface character and the glacial activity at the time of deposition. Deposition of more than two metres of till has created a hummocky topography with relief of greater than three metres to the north, and to the southwest of the lake. A thin layer of till covers the area to the west and northwest (generally less than two metres thick). The east side has discontinuous till cover over bedrock. These surficial geology data are being mapped at a 1:50,000 scale by the Alberta Research Council, but are unpublished at present. Availability of groundwater from glacial till is often a problem. The high clay content and general mixing of material causes low permeability.

b) Groundwater Availability

Groundwater availability is commonly evaluated for subdivision applications using a 20-year safe yield calculation. This calculation yields a number ("Q_{20}") which represents the rate at which an individual well can be pumped continuously for a period of 20 years, before the water level in the well would be drawn down to the top of the producing zone.

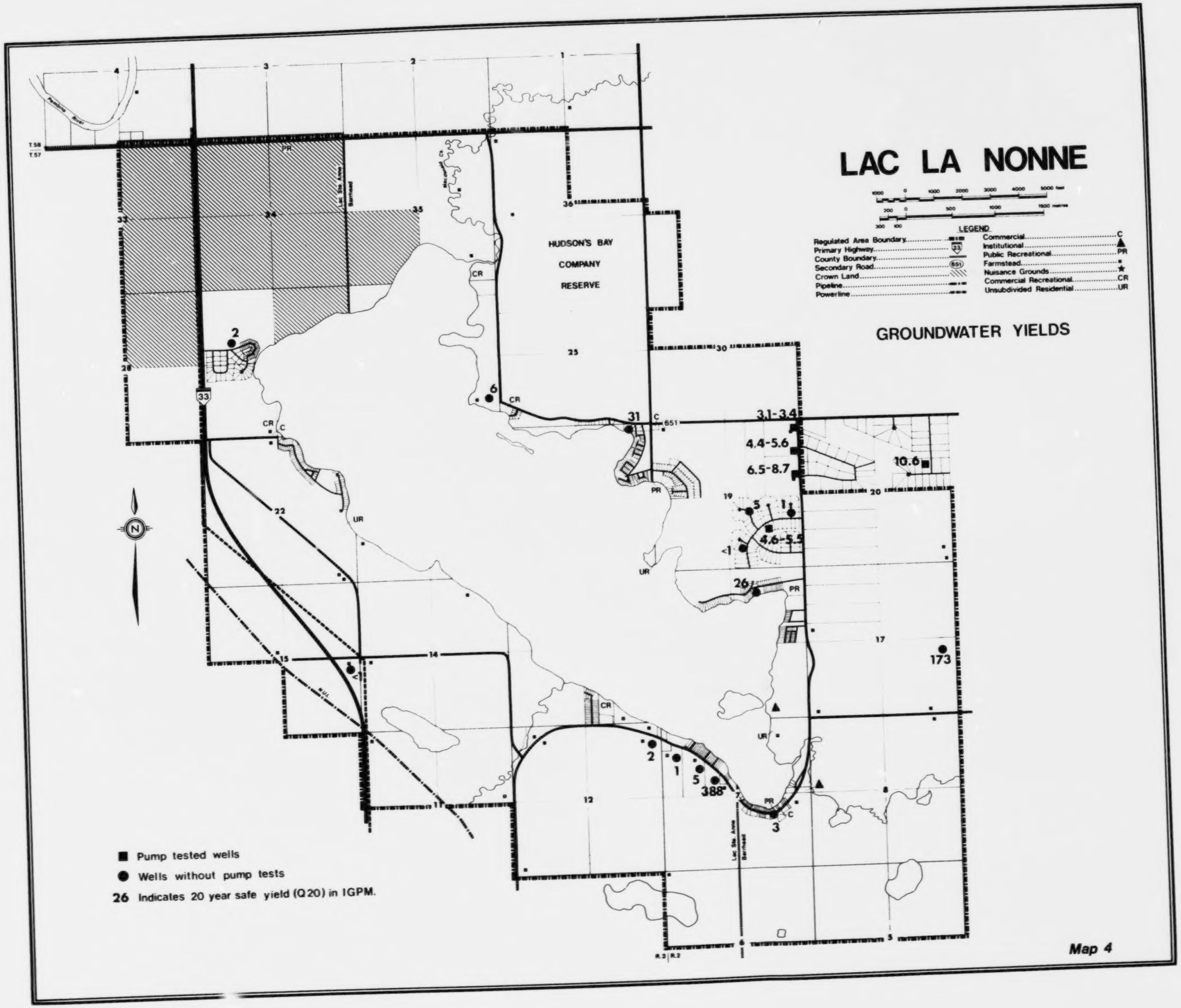
A rough estimate of the Q_{20} of a well can be made with short-term pumping after initial drilling of the well, but a better estimate can be provided by a long-term pump test. Alberta Environment makes recommendations on all phases of pump tests. The length of the test is the responsibility of the consultant who actually conducts the test. Nineteen Q_{20} values for the Lac La Nonne area are shown (in approximate locations) on Map 4. The obvious discrepancies between wells within the same quarter section should be noted. This could be caused by many factors - for example, the bedrock material each well finishes in, the well construction, or the pumping period. Q_{20} values from pump tests are available for five wells. These calculations are the most reliable. Their average is 28.6 litres per minute (6.3 imperial gallons per minute). A range is usually given for pump test results because an assumption of aquifer thickness is required. A high and low value is usually used, yielding a range of Q_{20} values. Since the bedrock should be similar all around the lake, the assumption could be made that this Q_{20} value of 28.6 litres per minute (6.3 imperial gallons per minute) is a reasonable average for the planning area.

Alberta Environment has set a standard for groundwater availability at 1090 litres per day (240 imperial gallons per day) per household or no more than six permanent households per quarter section per imperial gallon per minute water available. Using this standard, 37 permanent households could be supported per quarter section around Lac La Nonne. This assumes the need of a communal well system, and that peak demands will be met without water shortage facilities. A controlled aquifer test on every quarter section would be required. Normally, however, communal water systems are discouraged because of the inherent operational and maintenance problems left with the municipality.

c) Groundwater Quality

The quality of drinking water is vitally important, yet it is completely unregulated for individual owners with private wells. Although water testing is recommended, it is not required. Water quality test records are relatively sparse and may reflect an abnormal number of poor quality wells since it is those people who request testing. Water quality for public water supplies is regulated by the appropriate health unit. The county water specialist will give advice on methods of water treatment.

Two health units have jurisdiction around Lac La Nonne. The east side (County of Barrhead) is within the Sturgeon Health Unit. The west side (County of Lac Ste. Anne) is in the Stony Plain-Lac Ste. Anne Health Unit. Separate standards are in effect for the two health units although in practice, they are applied similarly. The Sturgeon Health Unit standards recognize the fact that the water quality cannot meet the Canadian Standards due to local conditions. The Canadian Standards have recently been revised. Local health units may revise their standards in the near future in response


LAC LA NONNE
1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Crown Land
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead ▪
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
GROUNDWATER YIELDS
HUDSON'S BAY COMPANY RESERVE
T.58
T.57
R.3 R.2
N
2
6
31
3.1-3.4
4.4-5.6
6.5-8.7
10.6
5
1
4.6-5.5
<1
26
173
<1
2
1
5
388
3
■ Pump tested wells
● Wells without pump tests
26 Indicates 20 year safe yield (Q20) in IGPM.
Map 4

to this revision. If a well sample exhibits unacceptable water quality, advice is offered on a course of action. If treatment is possible, the landowner is referred to the county water specialist who helps the landowner is this regard.

Four water quality parameters are potential problems in the Lac La Nonne area - sodium, bicarbonates, iron and TDS (total dissolved solids). Sodium can give a disagreeable taste at concentrations over 300 mg/l. It is significant for people requiring low sodium diets (e.g. hypertension or congestive heart failure patients) at values greater than 20 mg/l. A 20 well average in the study area is 408 mg/l with a range of 270-575 mg/l. It is, however, a voluntary treatment parameter and people concerned with high sodium values may install individual water distillers. Approximately 25 l/day (5 gal/day) is required per household for drinking and cooking purposes.

High levels of bicarbonates are a problem inherent to the bedrock. Although it poses no direct health hazard, and is not included in the Canadian Standards, high bicarbonates cause a gasiness in the water that can act as a laxative or cause general digestive tract disturbances. It also causes scaling problems on appliances and plumbing fixtures. The only way to overcome the problem is to use distilled water. A 19 well average around Lac La Nonne is 870 mg/l of bicarbonates. Several wells had values over 1000 mg/l, the Sturgeon Health Unit standard.

High iron concentrations are often a problem around Lac La Nonne. Concentrations greater than 0.3 mg/l can cause incrustation of pipes, staining of clothing, plumbing and fixtures, undesirable taste, and growth of iron bacteria which may clog pipes with slime. Iron concentrations tend to be higher in shallow wells finished in glacial till. Iron bacteria tend to be a recurring problem especially in deeper wells. Once a well is contaminated with the bacteria, deep wells are difficult to disinfect. The average figure for 27 tests around Lac La Nonne was 0.64 mg/l of iron, far below the Sturgeon Health Unit standard of 8 mg/l. The iron can be filtered out using a potassium permanganate filter, but such filters are expensive. Shock chlorination treatments are commonly used once or twice a year to control iron bacteria problems.

TDS is a non-specific parameter that indicates the presence of excessive concentrations of some substance. In this area, sodium and iron are the cause of high TDS values. Resolution of problems with those parameters would alleviate the high TDS problem.

The groundwater of the area, then, cannot be of excellent quality. Some parameters may be at high enough levels to warrent condemnation, if the well were for public use. Health officers will allow some variance from the standards, however. For the occasional user, the water quality can be tolerated. For permanent residents, some treatment for sodium, bicarbonates or iron may be desirable or necessary. Residents should have their water tested periodically through the local Health Unit if they are concerned in any way about their water quality. Well testing is a free service.

TABLE 3

DRINKING WATER QUALITY STANDARDS USED IN THE LAC LA NONNE AREA

	GUIDELINES FOR CANADIAN DRINKING WATER QUALITY 1978* (mg/l)	STURGEON HEALTH UNIT** (mg/l)
TDS	500	1500 (1600 depending on type of ions)
SULPHATE	500	600 (800 if all other conditions met)
CHLORIDE	250	350
NITRATE (as N)	10	45
NITRITE (as N)	1	2
AMMONIA (as N)		10
HARDNESS		500 (as Ca + Mg) 700 if all other conditions met
IRON	0.3	8
ALKALINITY (as $CaCO_3$)		1000
CARBONATE		350
BICARBONATE		1000
FLUORIDE	1.5	2
SODIUM + POTASSIUM		500 if softening not necessary, 600 if all other conditions met
pH	6.5 - 8.5	6.5 - 10.0 if all other conditions met
CALCIUM		200
SILICA		50
MAGNESIUM		100
POTASSIUM		340
MANGANESE	0.05	

* Used by the Stony Plain-Lac Ste. Anne Health Unit (west side of Lac La Nonne)

** East side of Lac La Nonne

Sources: Health and Welfare Canada, Guidelines for Canadian Drinking Water Quality 1978; Sturgeon Health Unit "Recommended Chemical Limits on Routine Drinking Water Parameters for Proposed Sub-division Developments", 1978.

3. Vegetation and Wildlife

a) Vegetation

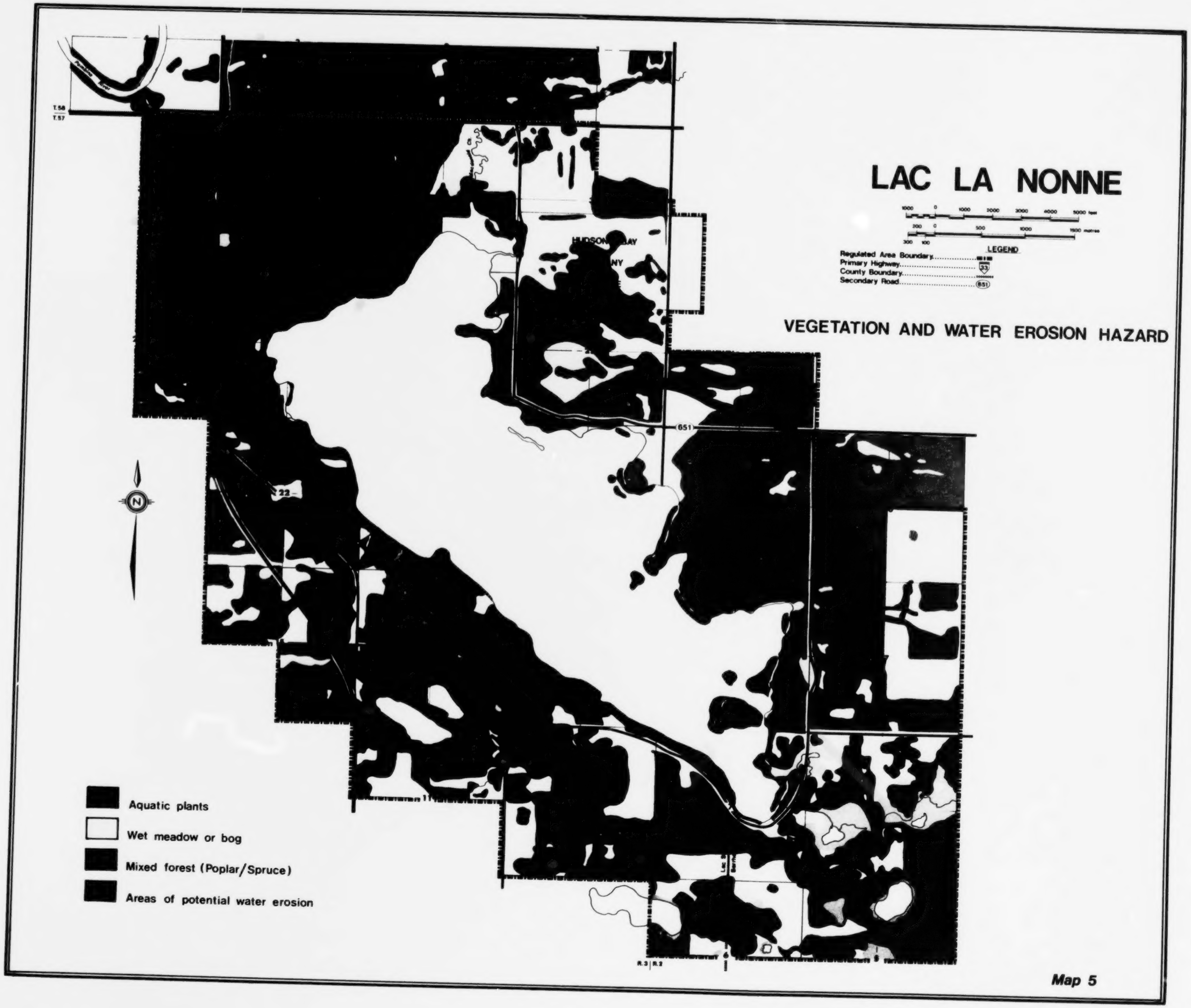
The Lac La Nonne planning area lies within a very large vegetation zone known as the "Boreal Mixedwood section" of the boreal forest. Glaciation produced clay-rich soils and a rolling topography that encouraged the growth of moderately productive "mixedwood" forests containing varying combinations of deciduous poplars and coniferous spruces. The forest supports bush undergrowth especially under the poplars. The natural forest succession is from poplar to spruce unless fires occur, in which case poplars will remain dominant. Trembling aspen poplar (Populus tremuloides) generally dominates in the well-drained soil areas, while balsam poplar (Populus balsamifera) dominates in the moister depressional sites. Black spruce (Picea mariana) bogs are found in poorly drained lowlands. Map 5 illustrates vegetation around Lac La Nonne. This map also outlines areas of soil erosion hazard, should the vegetation be completely removed.

In most of the planning area, the tree canopy is a mixture of poplars and white spruce (Picea glauca). This mixture makes for a "hybridization of habitats" - one different from the habitats of pure stands of either species. For example, overall light conditions will be between the shadiness of conifers and the seasonal harshness of poplars. Both leaves and needles will fall to the ground, creating organic products of decomposition that do not occur elsewhere. This produces a thin soil organic layer unique to mixedwood canopies.

The understory of a mixedwood forest typically is transitionally between that of a poplar forest and that of a spruce forest. Shrubs characteristic of poplar forests are willow, saskatoon, red osier dogwood, red raspberry, hazel, buffaloberry, wild rose, and currant species. Species likely to be found in the ground-cover layer include sarsaparilla, snowberry, asters, vetches, twinflower, strawberry, bunchberry, wintergreen and horsetails. These are typical of open sunny forests with abundant supplies of decaying leaf matter. The dark, humid spruce forest typically has little shrub or herbaceous growth. The slow decomposition of acidic needles adds to soil problems. Typically, mosses are the only undergrowth. Conditions at individual sites in a mixedwood forest will, therefore, dictate the understory at that location. Wide variation is found in short distances depending on the overstory type.

Throughout the area there are many wet depressional sites. Some of these are sedge peat bogs where sedges (Carex spp.) and slough grass (Beckmannia spp.) predominate. Willow (Salix spp.), dwarf birch (Betula glandulosa) and alder (Alnus spp.) are found surrounding these areas. This sedge-dominated organic area is extensive southeast of Lac La Nonne, along the creek from Nakamun Lake.

A large depressional area in SW 25-57-3-W5 contains moss peat, and a different type of vegetative community exists. Black spruce, tamarack (Larixlaricina), Labrador tea (Ledum groenlandicum), sphagnum (Sphagnum spp.) and plume moss (Hypnum spp.) characterize these "spruce bogs".


T.58
T.57
HUDSON BAY
NY
651
22
R.3 | R.2
1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Aquatic plants
Wet meadow or bog
Mixed forest (Poplar/Spruce)
Areas of potential water erosion

LAC LA NONNE

VEGETATION AND WATER EROSION HAZARD

Map 5

Beds of emergent aquatic plants have developed along the shoreline. Giant reed grass (Phragmites communis), hardstem bulrush (Scirpus acutus) and cattail (Typha latifolia) are found naturally.

These naturally occurring vegetation types have been altered, at times drastically, in the planning area. Fairly extensive clearing for agriculture has removed the natural forest associations. Selective clearing in cottage subdivisions has occurred. Problems with blowdowns in poplar dominated areas is accentuated by this clearing. Along the shoreline, shrubs and trees have been removed for better viewing of and access to the lake. Aquatic plants have also been removed to improve access to the lake and aesthetic appeal of the shoreline. Alterations to the understory have also occurred.

b) Wildlife and Fish - Canada Land Inventory

Wildlife and fish populations around Lac La Nonne are not well documented. Information is based largely on the Canada Land Inventory (C.L.I.) Land Capability for Ungulates, Land Capability for Waterfowl, and Water Capability Classification for Sport Fish. Map 6 outlines the C.L.I. Capabilities for Ungulates, Waterfowl and Sport Fish at Lac La Nonne.

The Canada Land Inventory classification system is based upon two important considerations: capability ratings are established on the basis of the optimum vegetational (successional) stage that can be maintained with good wildlife management practices; and, capability ratings do not reflect present land use, ownership, lack of access, distance from cities, or amount of hunting pressure.

In general, wildlife species have certain like needs - a sufficient amount and quality of food, and protective cover and space for survival, growth and reproduction. The ability of the land to meet these needs is determined by species requirements, the physical characteristics of the land, and factors which influence plant and animal communities.

C.L.I. maps are divided into units based on the physiographic characteristics important to, in this case, ungulates and waterfowl. The degree of limitation determines the capability class, and the subclass denotes the primary factor(s) causing the limitation. Class 1 is the highest capability category. The Lac La Nonne area ranges from Class 3 to Class 5 for Ungulates and Waterfowl and Class 2 for Sport Fish.

In the Lac La Nonne area, most of the land is rated as Class 3 or 4 for its ability to produce food and cover for Moose, Elk and Deer (ungulates). In the north, west and south portions of the planning area, 80% of the land is Class 3 having slight limitations due to excessive soil moisture, lack of nutrients or low soil fertility, and poor distribution of landforms: the strongly rolling "knob and kettle" topography results in flat-topped, steep-sided hills with depressions between, that are wet and sometimes filled with peat. There are pockets of Class 5 land having moderately

LEGEND FOR MAP 6

C.L.I. CAPABILITY FOR UNGULATES, WATERFOWL AND SPORT FISH

C.L.I. Land Capability for Wildlife - UNGULATES

7	2	1	Area of which 70% is Class 3 for the production of Moose, Elk and Deer (MED), with slight limitations due to poor soil moisture (M) and poor distribution of landform (G); 20% is Class 5 with moderately severe limitations due to poor soil moisture and adverse soil characteristics (N); 10% is Class 3 with slight limitations due to low soil fertility (F) and poor soil moisture.
3M	5M	3F	
G	N	M	
MED	MED	MED	

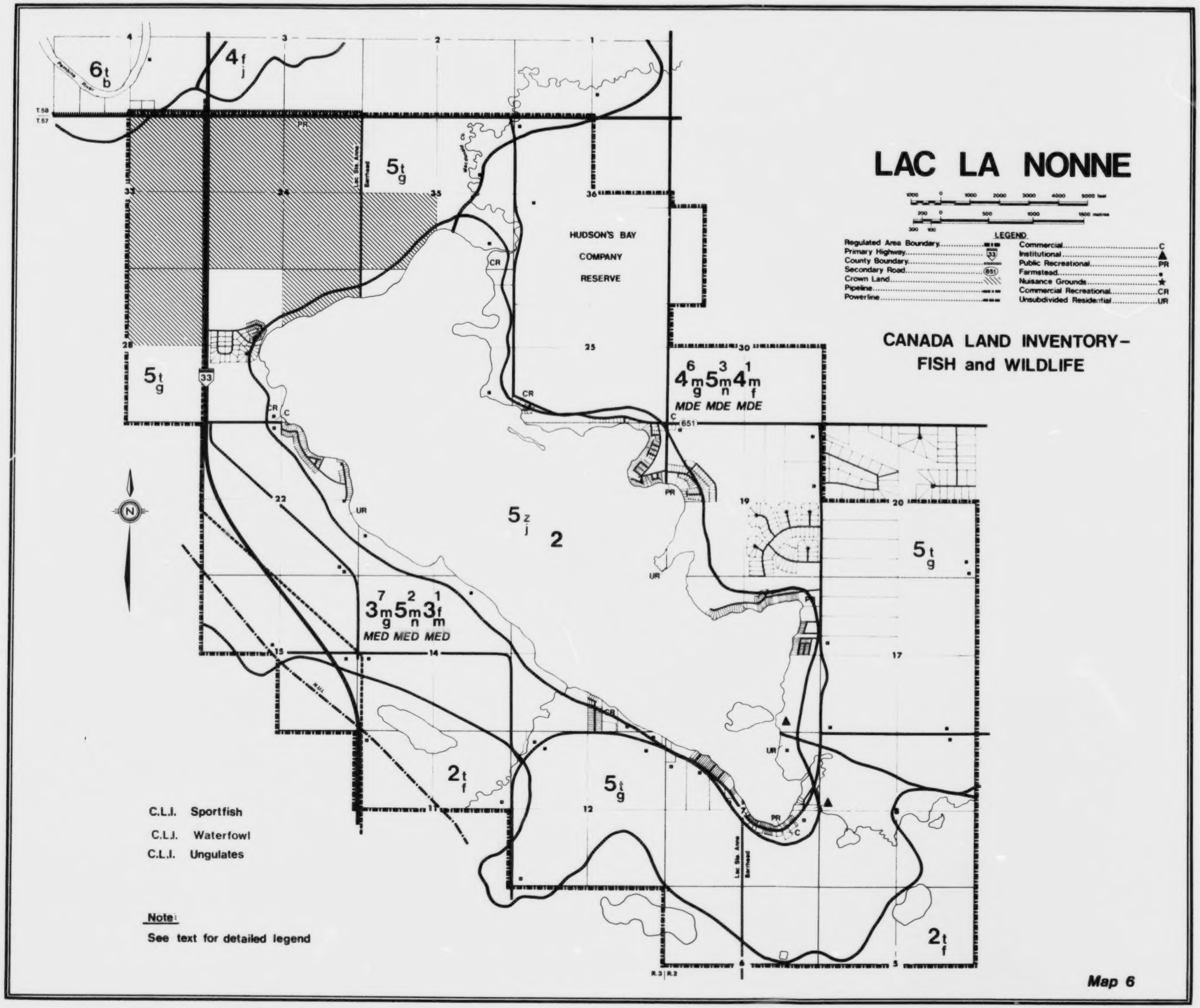
6	3	1	Area of which 60% is Class 4 for Moose, Deer and Elk (MDE), with moderate limitations due to poor soil moisture (M) and poor distribution of landform (G); 30% is Class 5 with moderately severe limitations due to poor soil moisture (M) and adverse soil characteristics (N); and 10% is Class 4 with moderate limitations due to poor soil moisture (M) and low soil fertility (F).
4M	5M	4M	
G	N	F	
MDE	MDE	MDE	

C.L.I. Land Capability for Wildlife - WATERFOWL

2^{T}_{F}	An area of Class 2 land for waterfowl production with very slight limitations due to adverse topography (T) and low soil fertility (F).
4^{F}_{J}	An area of Class 4 land for waterfowl production with moderate limitations due to low soil fertility (F) and reduced marsh edge (J).
5^{Z}_{J}	The lake is rated Class 5 for waterfowl production with moderately severe limitations due to excessively deep waters (Z) and reduced marsh edge (J).
5^{T}_{G}	An area of Class 5 land for waterfowl production with moderately severe limitations due to adverse topography (T) and landforms (G).
6^{T}_{B}	An area of Class 6 land for waterfowl production with severe limitations due to adverse topography (T) and free-flowing water (B).

C.L.I. Water Capability Classification for Sport Fish

2	Lake water has few or minor limitations on sport fish production.



Map 6

LAC LA NONNE

CANADA LAND INVENTORY–
FISH and WILDLIFE

1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Crown Land ▨
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead •
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
HUDSON'S BAY
COMPANY
RESERVE
C.L.I. Sportfish
C.L.I. Waterfowl
C.L.I. Ungulates
6 t b
4 f j
5 t g
5 z j
2
4 6 m g 5 3 m n 4 1 m f
MDE MDE MDE
3 7 m g 5 2 m n 3 1 f m
MED MED MED
2 t f
T.58
T.57
R.3 R.2
33
651
PR
CR
UR
C
Pembina River
Lac Ste Anne
Barrhead
4
3
2
1
33
34
35
36
28
25
30
22
19
20
15
14
17
11
12
6
5

Note:
See text for detailed legend

severe limitations due to salt-affected soils and excessive soil moisture. Approximately 70% of the lands east of the lake are Class 4, having moderate limitations similar to those of Class 3 lands. The landform limitation is caused by the depressional sites which lack the necessary browse vegetation.

Lac La Nonne generally has moderately severe limitations (Class 5) for waterfowl production. The lake has excessively deep water for good habitat (too deep for emergent plants to grow), and has a reduced marsh edge because the shoreline is generally too steep for the development of optimum marsh conditions. In the shoreland area, the limitations are adverse topography and landforms. The steepness and undulating nature of the land, especially on the west side of the planning area, limits the development and permanence of wetlands, and creates a poor distribution of marshes suitable for waterfowl. Only two small areas of marshland southeast and southwest of the lake are rated as Class 2 with slight limitations. These slight limitations are adverse topography and low soil fertility for insufficient nutrients in the soil and water for optimum plant growth. The northwest corner of the planning area, adjacent to the Pembina River, is rated Classes 4 and 6, with moderate to severe limitations for waterfowl due to low soil fertility, a reduced marsh edge, adverse topography and free-flowing water (Pembina River).

Lac La Nonne has a high C.L.I. capability for warm water sport fish such as northern pike (jackfish), walleye (pickerel) and yellow perch. It is rated as Class 2 with few or minor limitations.

Pike are quite a common species in Lac La Nonne, while the more desirable walleye is less common. In the past several years, there have been indications of a recovery of the walleye population. Lac La Nonne now is a fairly important water body for recreational fishermen. Tullibee are present in large numbers. Prior to 1975, commercial fishing primarily for Tullibee, was permitted at Lac La Nonne. However, at the present time, commercial fishing licences are not issued. During winter, Pike and Perch are the main catches. At present, a fish stocking program for Lac La Nonne does not exist nor is one anticipated for the future.

Complaints have been made in the past several years, about beaver dams on Majeau Creek impeding the flow of water from Majeau Lake and preventing the migration of fish to Lac La Nonne. Investigation by the Fish and Wildlife Branch indicates that the removal of several beaver dams would not improve the situation, even in the short term. They indicated that despite the barricades, the majority of the fish population is able to migrate to Lac La Nonne.

c) Wildlife Habitat Description

The Lac La Nonne planning area is capable of supporting a fairly wide variety of wildlife species as a function of habitat diversity. Habitat types range from undisturbed natural areas to highly developed areas.

Shoreline habitat is generally the most productive. The interface of water, aquatic and terrestrial vegetation and open and forested lands provides habitat for small mammals, furbearers, ungulates, songbirds, raptors and waterfowl. Although the lake is deep and conditions are not optimum for waterfowl, there are some species that utilize Lac La Nonne. The open waters do allow feeding, resting and protection for birds such as grebes, coots, ducks, merganzers, and herons. Grass wetlands, and sedge and moss bogs also provide habitat for shorebirds, waterfowl and other waterbirds, such as herons and gulls.

The area lacks a good distribution of wetlands and permanent sloughs, resulting in the poor capability rating for waterfowl. The few scattered bogs do provide some habitat for muskrats, some shorebirds and white-tailed deer. The natural "mixedwood" forest of deciduous poplars and coniferous spruces and associated understory species is valuable habitat for ungulates, small mammals, and birds such as grouse, hawks and owls. Although the capability does exist for moose, elk and deer according to C.L.I., in actuality, the white-tailed deer is the primary ungulate species found in the area. Moose and elk are much less common. Extensive tracts of cleared agricultural lands for pasture and cultivated fields are favoured by deer, but are less valuable to moose and elk. Low density residential and resort land use which has maintained some of the natural forest and ground cover and some emergent shoreline vegetation, provides habitat for furbearers and some bird species which are not greatly affected by increased human populations. High density recreation areas provide minimal quality habitat and therefore, support little more than human-tolerant bird species, and small mammals such as squirrels. Residents at Lac La Nonne have observed the Great Blue Heron, but have indicated that these sightings occur during the spring and fall migration periods and are not associated with nesting.

4. Soils Analysis for Future Land Use

a) Introduction

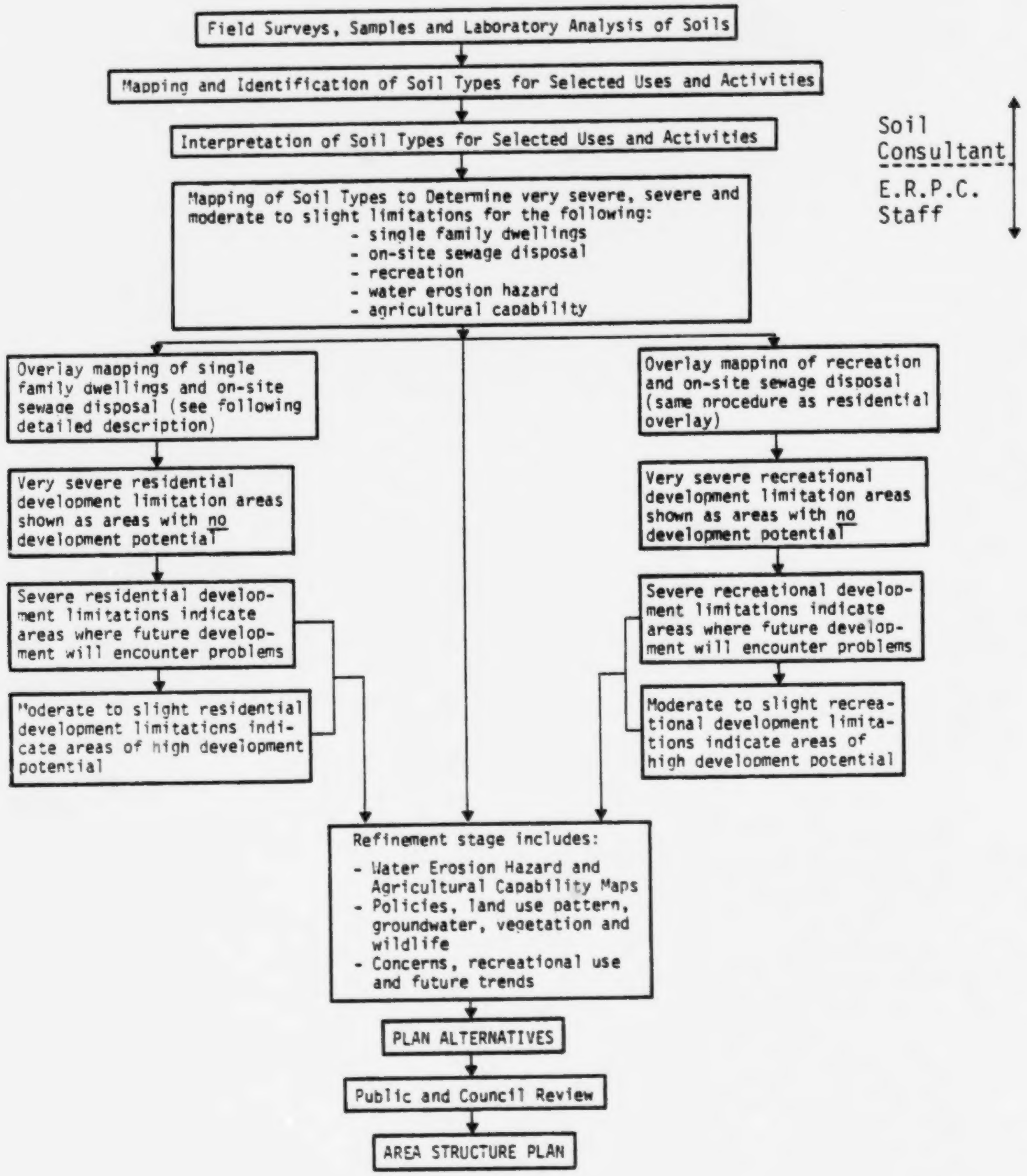
The analysis of soils information to assist in determining future land use at Lac La Nonne is based upon a report entitled: Soil Survey and Land Suitability Evaluation of the Lac La Nonne Study Area. This report was prepared for Alberta Environment by Pedology Consultants in December, 1977.

The engineering qualities of the soils were determined by the soils consultant through extensive field observations, soil samples and laboratory testing. This information has been recorded in the consultant's report on maps, tables and written text. From this information, soil capability for construction materials, foundations of roads and buildings, and sites for recreation facilities has been determined.

After meeting with the consultant to establish an acceptable mapping procedure, the information tables contained in the report were reproduced in map format by staff. These maps, showing three levels of limitation (very severe, severe, and moderate to slight) were combined by the overlay process to determine areas where future land use changes could be considered, as well as areas where severe and very severe problems would be encountered if a change in land use is undertaken. In addition, the soils report includes an update of agricultural soil capability in the planning area.

Figure 4 summarizes the methodology used to incorporate the soils information.

FIGURE 4 INCORPORATION OF SOILS INFORMATION


Field Surveys, Samples and Laboratory Analysis of Soils
Mapping and Identification of Soil Types for Selected Uses and Activities
Interpretation of Soil Types for Selected Uses and Activities
Mapping of Soil Types to Determine very severe, severe and moderate to slight limitations for the following:
- single family dwellings
- on-site sewage disposal
- recreation
- water erosion hazard
- agricultural capability
Soil Consultant
E.R.P.C. Staff
Overlay mapping of single family dwellings and on-site sewage disposal (see following detailed description)
Very severe residential development limitation areas shown as areas with no development potential
Severe residential development limitations indicate areas where future development will encounter problems
Moderate to slight residential development limitations indicate areas of high development potential
Overlay mapping of recreation and on-site sewage disposal (same procedure as residential overlay)
Very severe recreational development limitation areas shown as areas with no development potential
Severe recreational development limitations indicate areas where future development will encounter problems
Moderate to slight recreational development limitations indicate areas of high development potential
Refinement stage includes:
- Water Erosion Hazard and Agricultural Capability Maps
- Policies, land use pattern, groundwater, vegetation and wildlife
- Concerns, recreational use and future trends
PLAN ALTERNATIVES
Public and Council Review
AREA STRUCTURE PLAN

b) Overlay Mapping of Single Family Dwellings and On-site Sewage Disposal to Determine Residential Development Potential

The following flow chart (Figure 5) and accompanying explanations, outline the approach used to determine residential development potential. Recreational development potential was determined by the same procedure. The actual maps produced as a result of this procedure follow Table 4.

FIGURE 5 SOILS OVERLAY MAPPING PROCEDURE

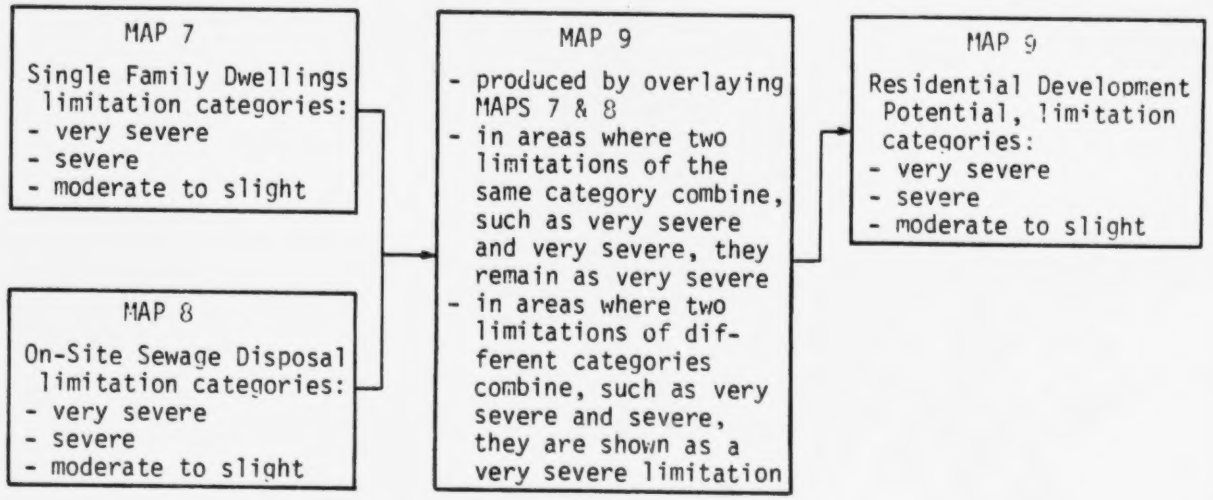
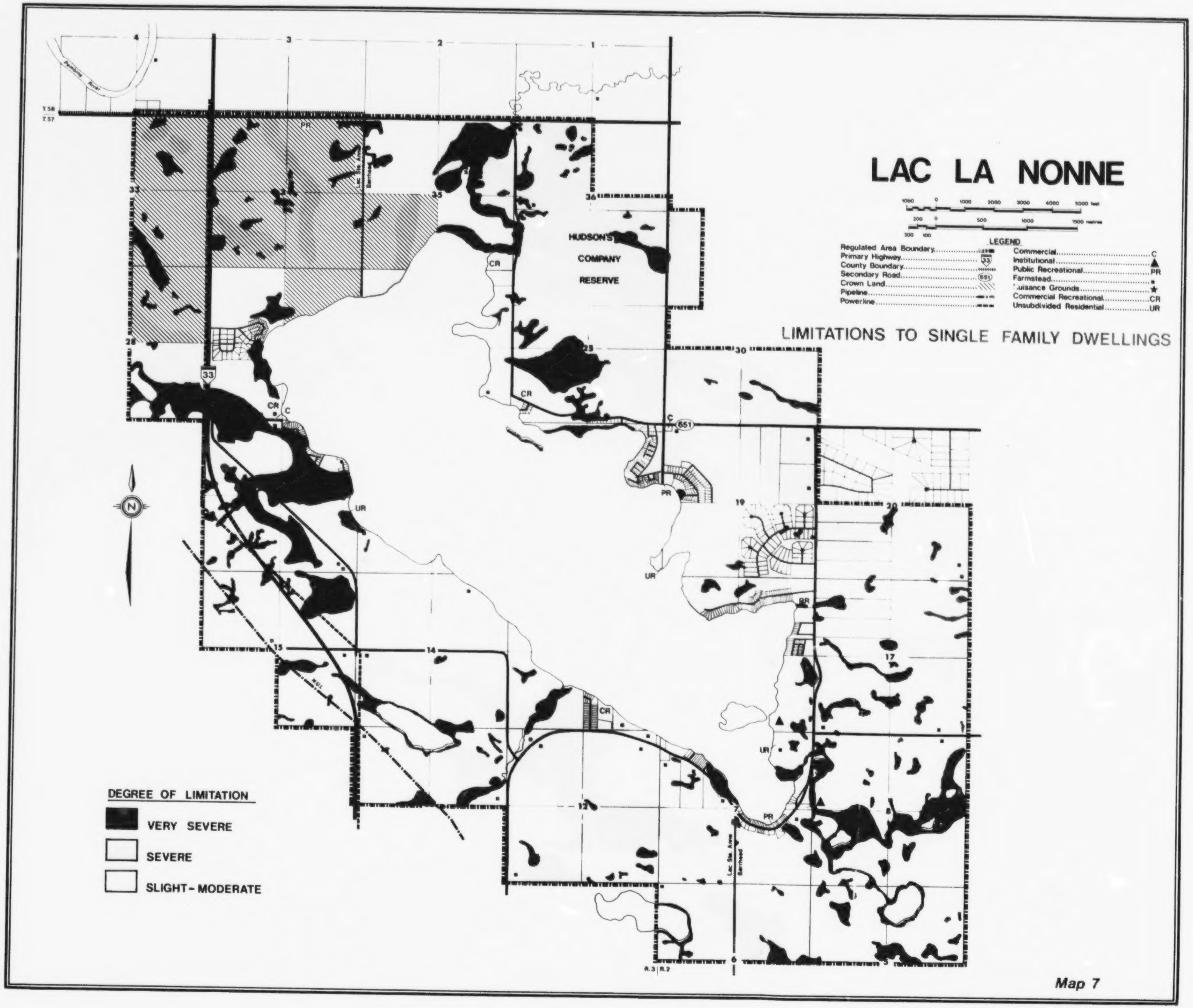

MAP 7
Single Family Dwellings limitation categories:
- very severe
- severe
- moderate to slight
MAP 8
On-Site Sewage Disposal limitation categories:
- very severe
- severe
- moderate to slight
MAP 9
- produced by overlaying MAPS 7 & 8
- in areas where two limitations of the same category combine, such as very severe and very severe, they remain as very severe
- in areas where two limitations of different categories combine, such as very severe and severe, they are shown as a very severe limitation
MAP 9
Residential Development Potential, limitation categories:
- very severe
- severe
- moderate to slight

Table 4 lists the soil characteristics contributing to the very severe and severe development limitations for selected uses. The maps that have been produced from the soils consultant report follow Table 4. These maps are: Single Family Dwellings, On-Site Sewage Disposal, Residential Development Potential, Recreation Limitation and Recreation Development Potential.

TABLE 4

LIMITING SOIL PROPERTIES AND HAZARDS FOR SELECTED USES IN THE LAC LA NONNE PLANNING AREA

Uses	Very Severe Limitations that Cannot Be Overcome by Design	Severe Limitations That Can Be Overcome by Design
ON-SITE SEWAGE DISPOSAL	Flooding Hazard (overflow) Seasonally High Groundwater Table or Surface Ponding Rapid Permeability (droughtiness) Groundwater Contamination Hazard Shallow Depth to Consolidated Bedrock Organic Soil	Excessive Slope High Clay Content Slow Permeability Thin Deposit of Sand and Gravel Shallow Depth to Sand or Gravel
SINGLE FAMILY DWELLINGS WITHOUT BASEMENTS	Flooding Hazard (overflow) Seasonally High Groundwater Table or Surface Ponding Organic Soil	Excessive Slope Surface Stoniness High Shrink-swell Potential
SINGLE FAMILY DWELLINGS WITH BASEMENTS	Flooding Hazard (overflow) Seasonally High Groundwater Table or Surface Ponding Shallow Depth to Consolidated Bedrock Organic Soil	Excessive Slope Surface Stoniness
CAMPING AND PICNIC AREAS	Flooding Hazard (overflow) Seasonally High Groundwater Table or Surface Ponding Organic Soil	Excessive Slope Surface Stoniness Sandy Surface Texture
HIKING TRAILS	. Flooding Hazard (overflow) Seasonally High Groundwater Table or Surface Ponding Organic Soil	Surface Stoniness Sandy Surface Texture

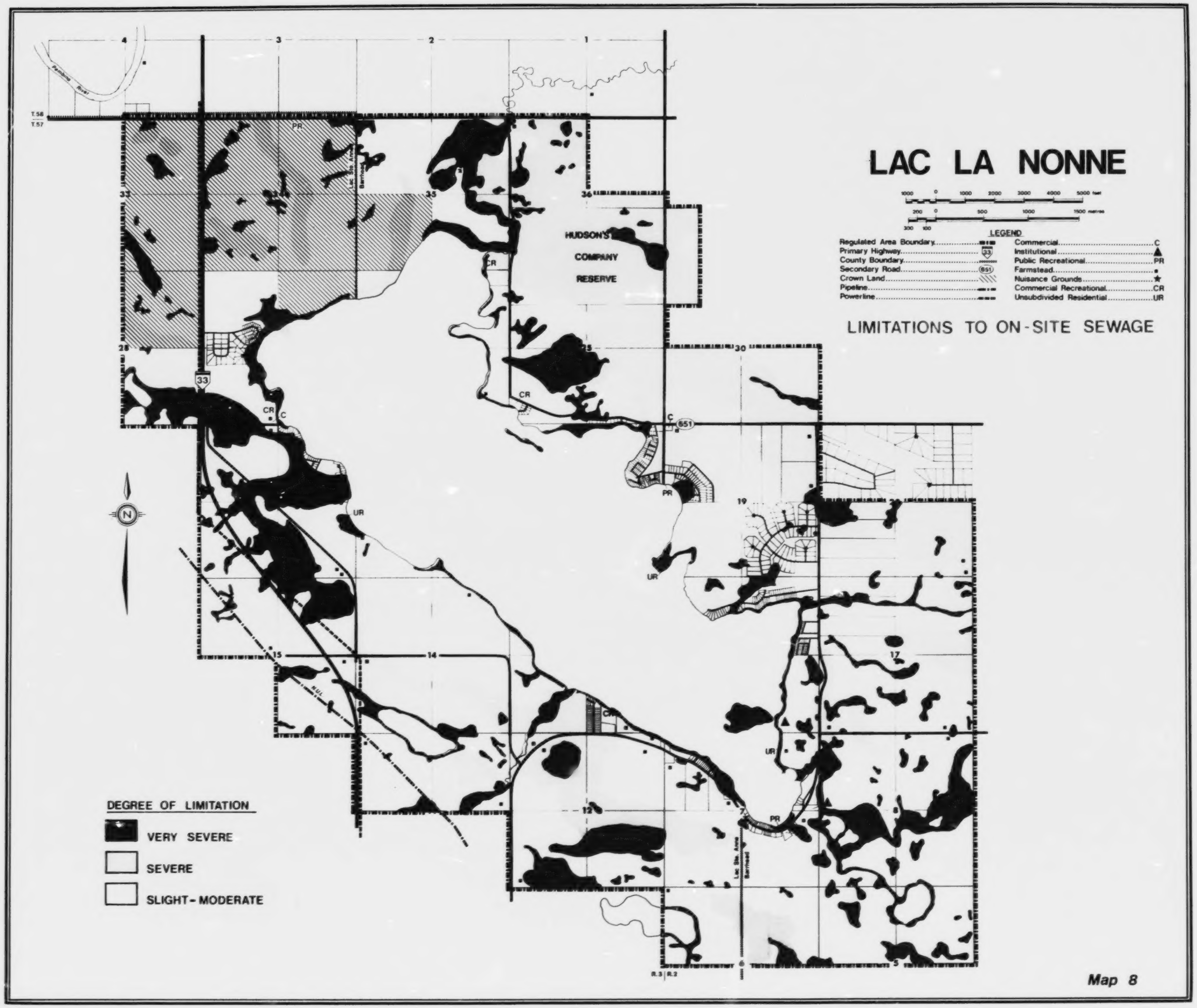


LAC LA NONNE

LIMITATIONS TO SINGLE FAMILY DWELLINGS

Map 7

1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Crown Land
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead ■
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
DEGREE OF LIMITATION
VERY SEVERE
SEVERE
SLIGHT - MODERATE
HUDSON'S
COMPANY
RESERVE
T.58
T.57
R.3 R.2
CR
C
PR
UR
33
651



LAC LA NONNE

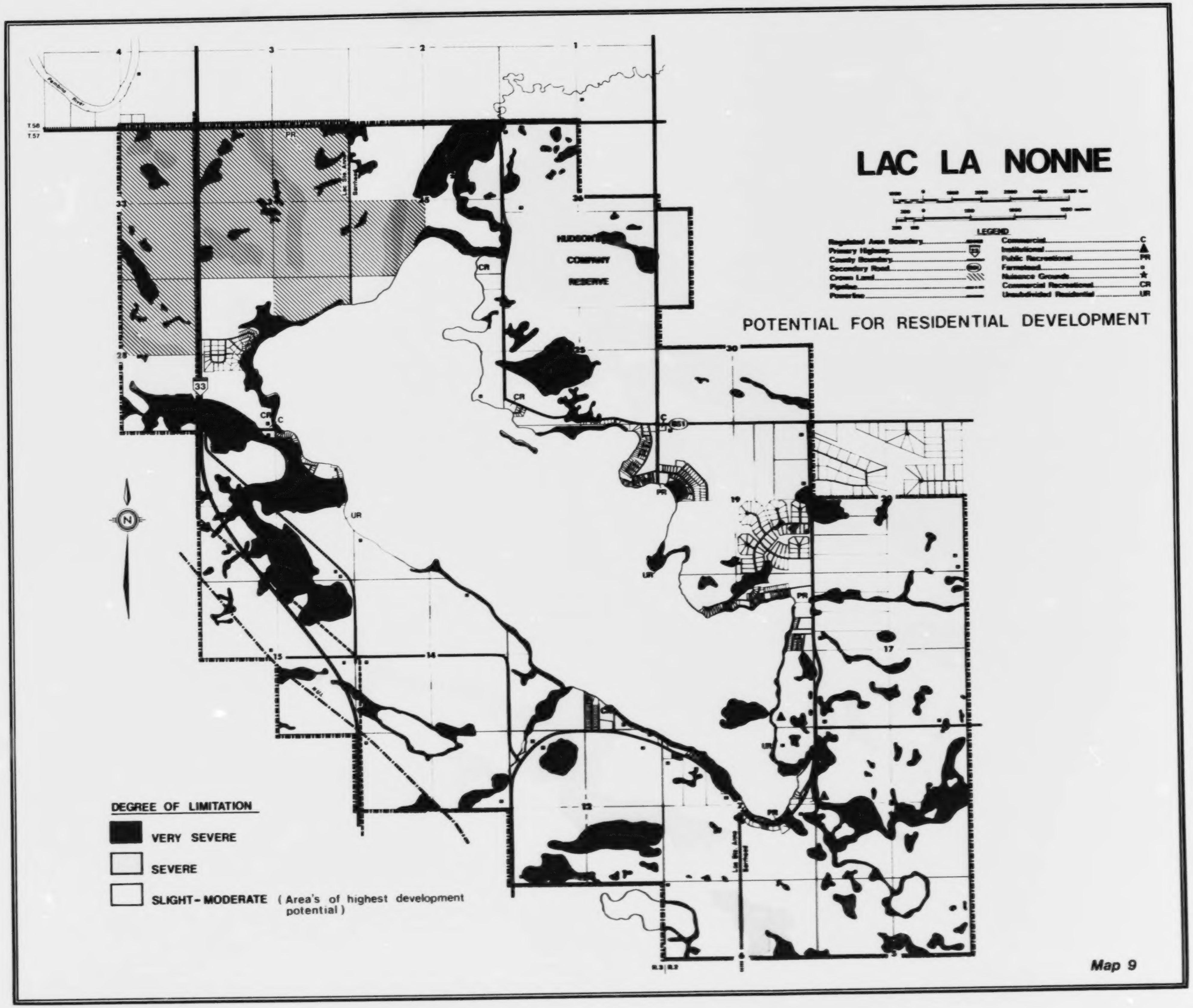
LIMITATIONS TO ON-SITE SEWAGE

Map 8

1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Crown Land
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead ●
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
DEGREE OF LIMITATION
VERY SEVERE
SEVERE
SLIGHT-MODERATE
HUDSON'S
COMPANY
RESERVE
T.58
T.57
R.3
R.2
Pembina River
Lac Ste Anne
Barrhead
4
3
2
1
33
34
35
36
28
25
30
19
17
15
14
12
7
6
5
CR
C
PR
UR
N

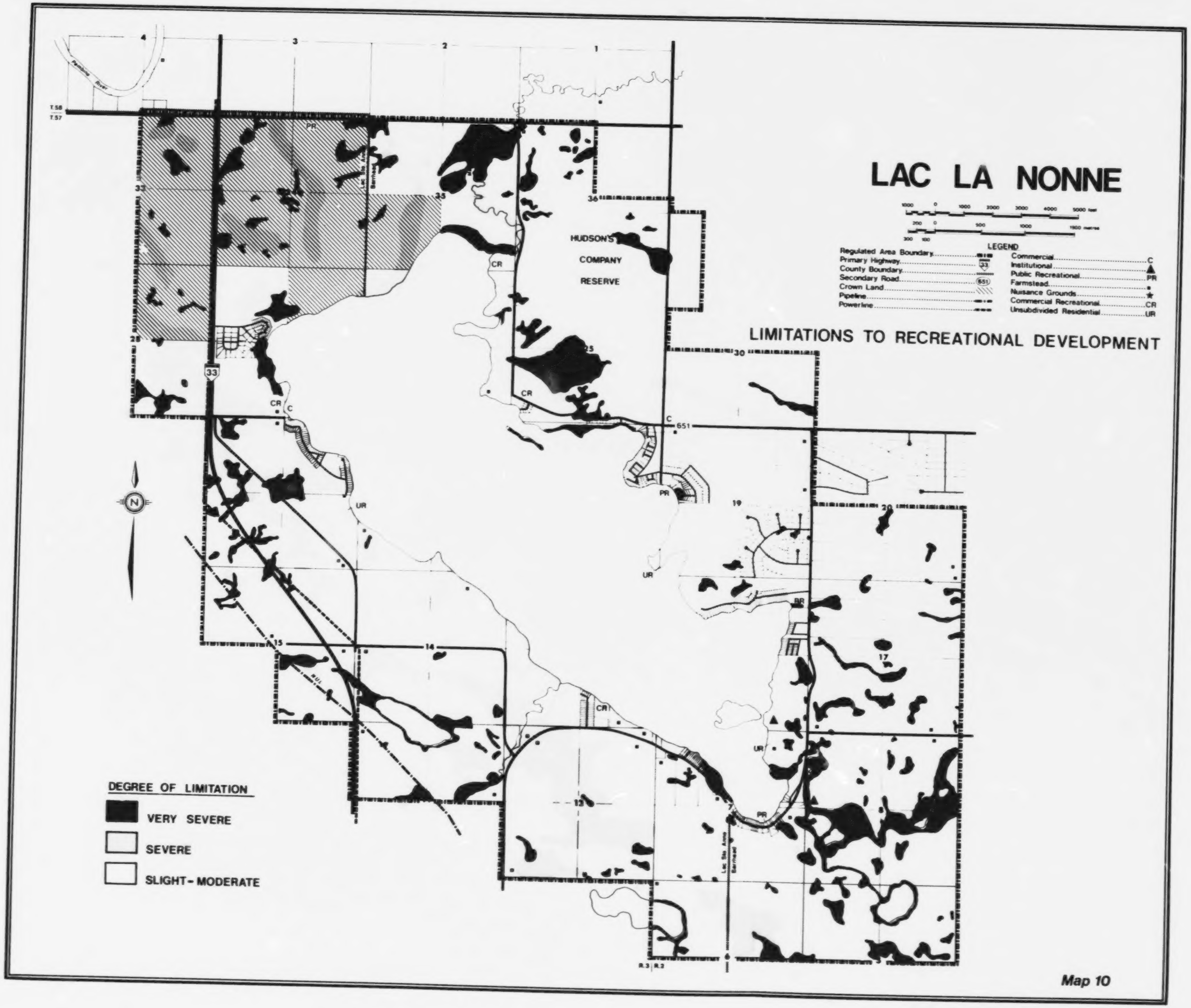
LAC LA NONNE

POTENTIAL FOR RESIDENTIAL DEVELOPMENT



LEGEND
Regulated Area Boundary
Primary Highway
County Boundary
Secondary Road
Crown Land
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead •
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
HUDSON'S BAY COMPANY RESERVE
DEGREE OF LIMITATION
VERY SEVERE
SEVERE
SLIGHT-MODERATE (Area's of highest development potential)
T.58
T.57
33
651
PR
CR
C
UR
N

Map 9

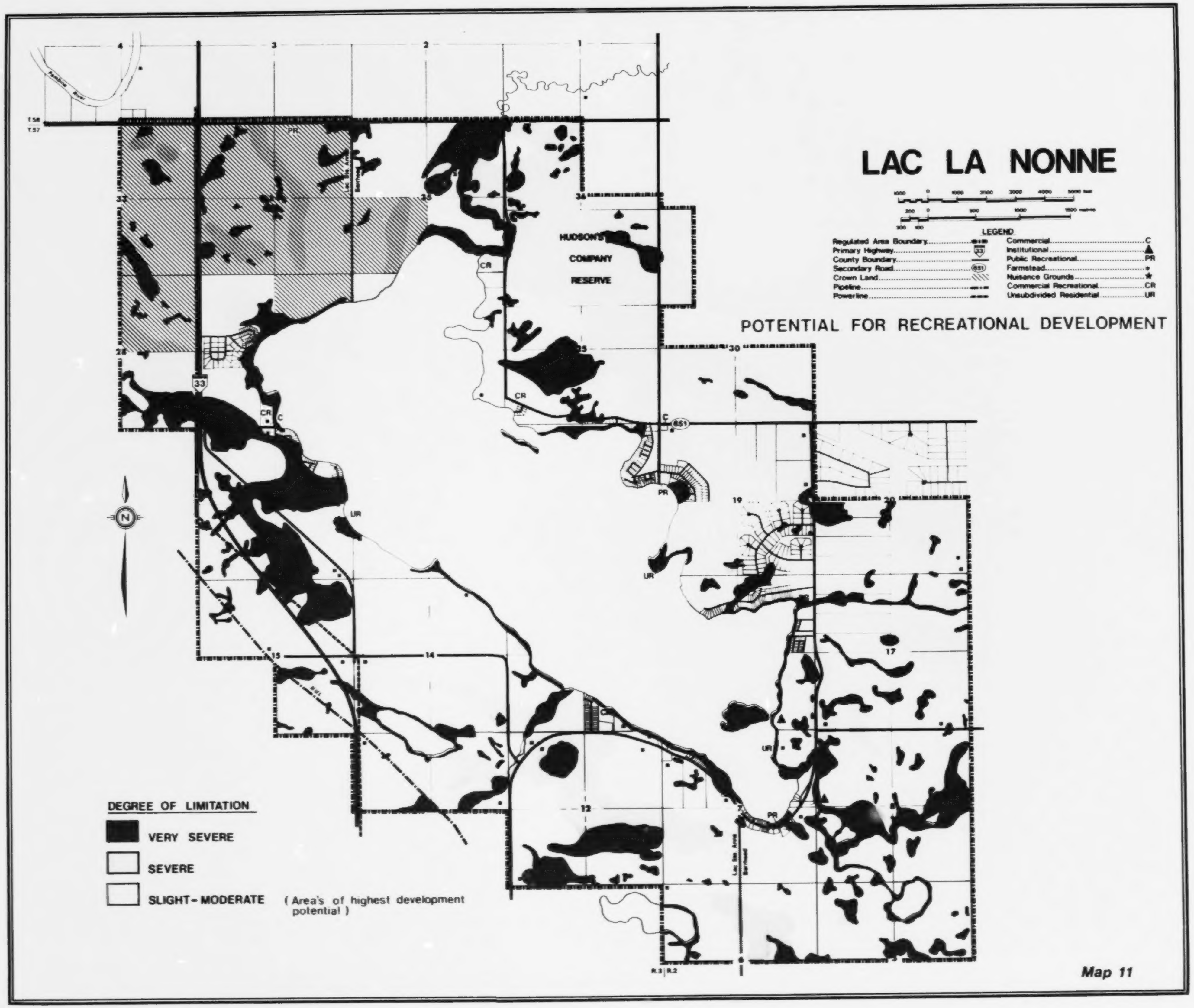


LAC LA NONNE

LIMITATIONS TO RECREATIONAL DEVELOPMENT

Map 10

1000
0
1000
2000
3000
4000
5000 feet
200
0
500
1000
1500 metres
300
100
LEGEND
Regulated Area Boundary
Primary Highway
33
County Boundary
Secondary Road
651
Crown Land
Pipeline
Powerline
Commercial C
Institutional .... ▲
Public Recreational .... PR
Farmstead .... •
Nuisance Grounds .... ★
Commercial Recreational .... CR
Unsubdivided Residential .... UR
DEGREE OF LIMITATION
VERY SEVERE
SEVERE
SLIGHT - MODERATE
HUDSON'S
COMPANY
RESERVE
T.58
T.57
R.3
R.2
4
3
2
1
33
35
36
28
25
30
19
20
17
15
14
13
CR
C
PR
UR
651
Pembina River
Barrhead
Lac Ste Anne
Barrhead



LAC LA NONNE

POTENTIAL FOR RECREATIONAL DEVELOPMENT

Map 11

1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Crown Land
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead •
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
DEGREE OF LIMITATION
VERY SEVERE
SEVERE
SLIGHT - MODERATE (Area's of highest development potential)
HUDSON'S COMPANY RESERVE
N
T.58
T.57
R.3 R.2
33
651
CR
C
PR
UR
4
3
2
1
33
35
36
28
25
30
19
20
17
15
14
13
12
7
6

5. Arable Soils

The Farmland Assessment and the Canada Land Inventory Soil Capability for Agriculture rating systems, were combined to determine arable soils in the Lac La Nonne planning area. The Farmland Assessment information was obtained from the Counties of Barrhead and Lac Ste. Anne. The Canada Land Inventory (C.L.I.) Soil Capability for Agriculture ratings were obtained from the Pedology Consultants report entitled: Soil Survey and Land Suitability Evaluation of the Lac La Nonne Study Area. This report updates and refines the original C.L.I. Soil Capability for Agriculture ratings that were developed for the Lac La Nonne area.

By combining these two agricultural rating systems, it is anticipated that the best possible method will have been used to determine agricultural soil capability and productivity. This information will be utilized to assess agricultural activity and land use in the area, and to provide a basis for agricultural conservation policies.

a) Farmland Assessment

All farmland in Alberta is rated for tax assessment purposes according to a uniform standard determining agricultural productivity. The system originated with the Alberta Soil Survey Storie system, but has been modified somewhat to suit assessment purposes. Each quarter section or parcel is visited by an assessor who evaluates the physical characteristics of the site based upon highest and best use of the land in its existing condition. The evaluation considers soil groups, surface layer depth, subsoil texture, topography, stoniness, tree cover, and other miscellaneous factors which affect the productivity or desirability of a parcel, but which are not directly related to the soil. Arable land is given a productivity rating - a percentage relative to the best arable land in Alberta (100%). Pasture or hayland is assessed using a grazing carrying capacity calculation (animal unit heads per acre), not a crop productivity calculation. Table 5 gives descriptions of the classes of arable land (adapted from the Alberta Soil Survey). Areas with a productivity rating of less than 16% are considered to be pasture and were not included in the table.

TABLE 5

FARMLAND ASSESSMENT CLASSES FOR ARABLE LAND

Productivity Rating (%)	Class Description
78 - 100	Very good to excellent arable
58 - 78	Good to very good arable
41 - 58	Fairly good to good arable
28 - 41	Fair to fairly good arable
16 - 28	Poor to fair arable

In the Lac La Nonne planning area, the quarter sections or parcels of land that had a productivity rating of 28% or greater, were considered viable arable lands. The 28% figure was used as the cut-off in determining productivity, since any figure lower than 28% is in most instances, considered pasture land, 27% being high quality pasture.

Arable land greater than 28% has been combined with the Agricultural Soil Capability Map (see Map 12). In the Lac La Nonne area, the highest productivity ratings were 53%, 47% and 44%. These areas are located along the shores of MacDonald Creek, the outlet of Lac La Nonne, situated in the northwestern portion of the planning area. A small area of 36% can be found along the extreme eastern study area boundary, with the largest areas of arable soils, between the 35% to 28% rating, located in the southern and southwestern portions of the planning area.

b) Canada Land Inventory - Soil Capability for Agriculture

In 1961, a new system of assessing soils was introduced under the Canada Land Inventory (C.L.I.) program. In the C.L.I. classification for agriculture system, the soils are grouped into seven classes according to their potentialities and limitations for agricultural use. In 1977, Pedology Consultants conducted a detailed soil survey of the Lac La Nonne planning area. The original C.L.I. agricultural soil classification system undertaken for the area in the 1960's, was updated and refined by the more detailed information available from the soils consultant's report. The classification method remained the same and is shown in the following table.

TABLE 6

C.L.I. SOIL CAPABILITY FOR AGRICULTURE CLASS SYSTEM

CLASS 1	No significant limitations in use for crops.
CLASS 2	Moderate limitations that restrict the range of crops or require moderate conservation practices.
CLASS 3	Moderately severe limitations that restrict the range of crops or require special conservation practices.
CLASS 4	Severe limitations that restrict the range of crops or require special conservation practices or both.
CLASS 5	Very severe limitations that restrict their capability to produce perennial forage crops, and improvement practices are feasible.
CLASS 6	Soils capable only of producing perennial forage crops and improvement practices are not feasible.
CLASS 7	No capability for arable culture or permanent pasture.
0	Organic Soils - (not rated).

The above table lists the broad or major capability classes assigned to the different soil areas. In addition to the broad classes, there are subclasses assigned to the broader classes (except Class 1). The subclasses outline thirteen different types of limitations or hazards with respect to the general capability of the soil for agricultural use. In the Lac La Nonne planning area there were six subclass categories affecting agricultural capability. The six subclasses are shown in the following table.

TABLE 7

C.L.I. SOIL CAPABILITY FOR AGRICULTURE SUBCLASS LIMITATIONS

D	Undesirable soil structure
T	Adverse Topography
M	Low moisture holding capability
W	Excess moisture
S	Two or more soil factors
C	Adverse climate

$3D^8 4W^2$ — indicates percent of each class

In determining arable soils using the farmland assessment sheets, 28% or greater productivity was considered arable. Similarly, the C.L.I. system was used to determine arable soils by including all soil zones that are composed of more than 50% of classes 2 and 3 soil capabilities. Class 1 Capability does not exist in the Lac La Nonne planning area and there is only one very small area of Class 2. Therefore, the majority of the soils considered arable by the C.L.I. classification system, are the Class 3 soil areas that are composed of more than 50% of Class 3 soils (see Map 12).

c) Summary

The Farmland Assessment system and the C.L.I. Soil Capability for Agriculture system, are two very reliable field checked sources of soil information available for the Lac La Nonne planning area. Each system outlines areas of arable land, but there are fundamental differences between the two. The primary difference is that farmland assessment is based upon an assessment of existing land use and recognizes the existing productivity of the land that is cleared for agricultural purposes. All areas currently under tree cover, are not given a farmland assessment rating, regardless of the soil quality. The C.L.I. system, on the other hand, is based upon soil capability and in some instances, agriculturally productive soil zones may be found beneath a dense tree cover. The treed areas are shown as having a high agricultural capability rating. Therefore, the farmland assessment rating is tied closely to the existing land use situation, whereas the C.L.I. system is based upon the type of soil and does not make provision for existing land use.

The farmland assessment system also reduces the productivity rating of a parcel of land by including miscellaneous farming economic factors such as oddly shaped parcels or dispersed sloughs. An increase in farmland assessment is influenced by the parcel proximity to highways and population centres and farmland management practices. The C.L.I. system, in contrast, is tied completely to the type of soil, and is not affected by external factors.

However, the differences in the two systems do not prohibit their combined use in assessing arable land. In fact, the two systems complement each other and combine to present a stronger case for determining agricultural productivity and the location of possible agricultural conservation policy areas. The farmland assessment rating and the C.L.I. Soil Capability for Agriculture system are combined in the following table.

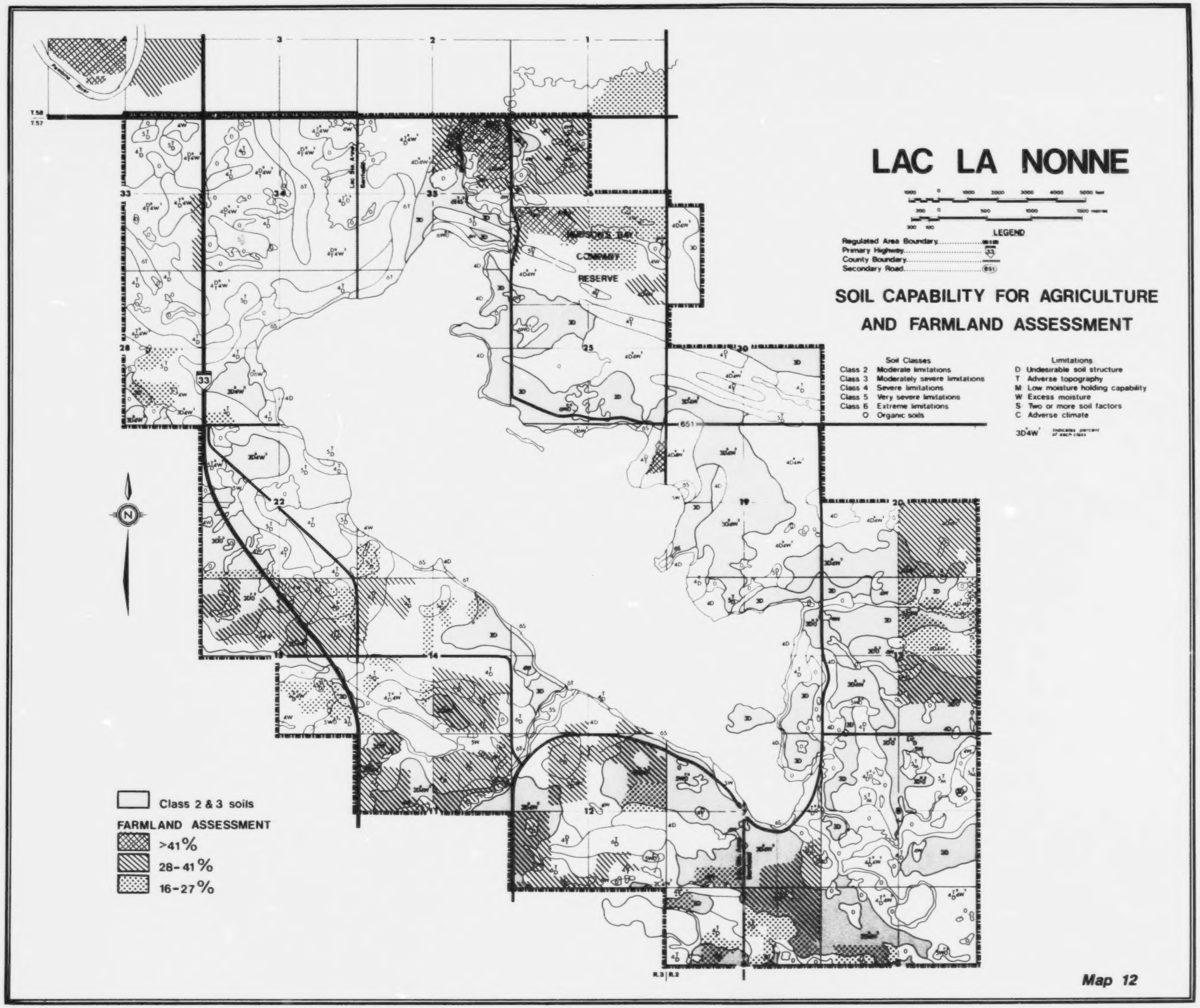
TABLE 8

A COMPARISON OF C.L.I. SOIL CAPABILITY FOR AGRICULTURE CLASSES AND FARMLAND ASSESSMENT PRODUCTIVITY RATINGS *

C.L.I. Class	Farmland Assessment Productivity Rating (%)
CLASS 1	68 - 100
CLASS 2	49 - 67
CLASS 3	34 - 48
CLASS 4	22 - 33
CLASS 5	9 - 21
CLASS 6	4 - 9
CLASS 7	0 - 4

Source: E.R.P.C., based upon Soil Ratings in Alberta, Alberta Institute of Pedology, June 1974; and Assessment Manual, Alberta Municipal Affairs Assessment Research and Systems, 1979.

An approximate correlation between farmland assessment and C.L.I. Soil Capability for Agriculture shown in the above table, is also shown in map format (see Map 12). Map 12 depicts the practical application of combining the two systems of assessing lands in the Lac La Nonne planning area.


LEGEND
Regulated Area Boundary
Primary Highway
33
County Boundary
Secondary Road
651
1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
Soil Classes
Class 2 Moderate limitations
Class 3 Moderately severe limitations
Class 4 Severe limitations
Class 5 Very severe limitations
Class 6 Extreme limitations
O Organic soils
Limitations
D Undesirable soil structure
T Adverse topography
M Low moisture holding capability
W Excess moisture
S Two or more soil factors
C Adverse climate
3D4W indicates percent of each class
Class 2 & 3 soils
FARMLAND ASSESSMENT
>41%
28-41%
16-27%
HUDSON'S BAY COMPANY RESERVE
T.58
T.57
R.3
R.2
N

LAC LA NONNE

SOIL CAPABILITY FOR AGRICULTURE AND FARMLAND ASSESSMENT

Map 12

B. SOCIO-ECONOMIC ANALYSIS AND INTERPRETATION

1. Questionnaire Information

The development of a lake management plan for Lac La Nonne involves the assessment, evaluation and incorporation of many sources of information. One of the main sources of information has been provided by questionnaires.

The three types of questionnaires, used to obtain information about Lac La Nonne, were: the landowner questionnaire; the trailer owner questionnaire; and the lake user questionnaire.

The landowner questionnaire, mailed to all 570 landowners in the Lac La Nonne planning area, has been the main source of information. A 53% return of this questionnaire has greatly assisted the planning team in determining public perceptions, obtaining factual information and assisting in foreseeing future demands.

The trailer owner and the lake user questionnaires have also assisted in the development of a lake management plan, but were not as useful as the landowner questionnaire. The trailer questionnaire, a modified version of the landowner questionnaire, was distributed to 500 holiday trailer owners, but only 6% were returned. The lake user questionnaire was used when personal interviews were conducted at public access points. A total of 21 parties were surveyed during two summer weekends. The low response of trailer owners, and the small number of weekend or day user parties interviewed, have reduced the reliability of this information. These small samples may not be representative of the majority of trailer owners who were unable to return the questionnaire, or the larger numbers of people who may come to Lac La Nonne on weekends. As a result, the landowner questionnaire with its 53% return, has become the most reliable information source.

Appendix A contains copies of the questionnaires that were distributed. The following discussion outlines the methodology used to incorporate the questionnaire information into the planning process.

a) Incorporation of Questionnaire Information

The questionnaire information has been classified into three main categories: public perceptions; factual information; and future demands. Public perceptions are the opinions people have regarding the lake and surrounding area. Based upon personal observations and experience at the lake which may involve a considerable length of time, perceptions include: road; lake or site conditions; boating congestion; or favourite activities. Public perceptions provided by the questionnaires have been incorporated into the public perceptions portion of this document - section B.2.

Factual information gathered from the questionnaires, includes the type of utilities and services available, the sources of drinking water, waste disposal methods, lake access, or boat ownership. This information is very useful, for example, in determining the services available in relation to the existing land use pattern. It must be kept in mind, however, that the facts collected are only representative of the people who answered the questionnaires. Factual information provided by the questionnaires has been included in the land use analysis section B.3 and future demands section B.6.

The last category involves future demands. Respondents were asked for their opinions on future lake and land use controls, service improvements, capital improvements and their long term plans. This information greatly assists in developing a lake management plan by providing overall guidance and by helping to assess future environmental and social impacts. This information has been included as part of section B.6 of the management study.

2. Public Perceptions

Public perceptions of the past, the present and the future play a significant role in the development of a lake management plan. At Lac La Nonne, these perceptions have been identified through the public meeting process and through landowner and lake user questionnaires.

a) The Initial Report and Public Meetings

Public meetings were held during the fall of 1980. These meetings were based upon an initial report that was circulated to all landowners and made available to non-landowners. This report contained basic background information, identified biophysical and socio-economic issues, and described the planning significance of these issues. The initial report also contained a preliminary list of landowner concerns that were expressed in the written comments section of the returned landowner questionnaires. Table 9, taken from the initial report, outlines the list of landowner issues identified prior to the public meetings.

TABLE 9

LANDOWNER ISSUES AT LAC LA NONNE
(determined by the written comments
section of the landowner questionnaire)

Issue \ Subdivision Name	Birch Cove (Norseman)	Chystyna	Mortensen	Williams	Winkleman	Lac La Nonne	Moonlight Bay	Moonlight Bay Estates	Idle Hours	Greendale	Redwood	Whiterock	Sunset Cove (Murray's Beach)
Expressions of Satisfaction													
- accessibility from home	1	1		1	2	1	1	2	1	1	no responses	1	
- nature appreciation and natural beauty		2	2	2	1		2						2
- quietness			1			2				2		2	
- investment potential	2							1					
- good sports fishing													1
- inexpensive lot price at time of purchase									2				
Expressions of Dissatisfaction													
- excess weeds and algae	1	1	1	1		1		2			no responses	1	
- excess noise and potentially dangerous or discourteous operation of motorboats, trail bikes and snowmobiles		2	2							1		2	1
- lack of adequate services - utilities, road maintenance police and fire				2	1				2				2
- lack of facilities and clean beach for the public	2					2	2			2			
- poor water wells (groundwater)				2			1						
- lack of lake access								1					
- poor sewage disposal									1				
- excess vehicular traffic					2								

1 - most important issue
2 - second most important issue

The public meetings and subsequent written briefs have been very beneficial to the politicians and the planning team. During the course of these meetings, the general public reiterated their original concerns, expanded and refined a list of issues that should be addressed, and formulated a list of recommendations for future planning. The issues identified and the recommendations made at the public meetings, addressed the following subject areas: lake water quality; fish and wildlife; winter and summer recreation; roads; waste disposal; utilities; police and fire protection; municipal council representation and taxation; and future recreation and residential development. These issues and recommendations involve the complete political spectrum from the federal government to the local municipal government. In addition, these issues and recommendations express a wide, often conflicting, range of opinions. However, one of the main challenges facing the politicians and the planning team, is to develop a final plan for Lac La Nonne that not only includes an assessment of known jurisdictional problems and environmental factors, but also includes the wide range of concerns, issues and problems that have been brought forth by the public at large.

The incorporation of public perceptions generated through the public meeting process, will be undertaken in the following ways. Firstly, the meeting results will be used to refine the broad goals and objectives of the Lac La Nonne Management Study. Goals and objectives guide the intent of the Management Study, especially when it is used to support forthcoming Plan Alternatives and the eventual final plan. Secondly, public recommendations that are beyond the jurisdictional mandate of the Management Study and eventual final plan, may be incorporated as policy statements directed toward the appropriate Federal, Provincial or Municipal Government agencies. Thirdly, public issues and recommendations directly applicable to the management study and the eventual final plan, will be used in the development of Plan Alternatives. The plan alternatives stage in the planning process comes between the Management Study and the final plan. The Lac La Nonne Plan Alternatives are one way for the diversities of public opinion to find expression. It is anticipated that the issues and recommendations generated from the initial public meetings will be expressed in greater detail by the plan alternatives. The plan alternatives will also be subject to a public forum before a final plan for Lac La Nonne is developed.

Appendix B contains the Complete Public Information Exchange Meetings Report, and includes all of the issues discussed and recommendations made during the initial public meetings.

b) Public Perceptions Generated From Questionnaire Information

The public perceptions of Lac La Nonne that have been gleaned through the landowner, trailer owner and lake user questionnaires, have provided considerable insight to the area. These perceptions, the opinions people hold of Lac La Nonne, are often based upon years of experience and observation.

Public perceptions obtained from the questionnaire information, will be organized into three areas: activities; problems; and boat observations. Boat observations will be included as part of the boating section (see section 6).

i) Activities

Questionnaire respondents outlined their preferred summer and winter activities. These perceptions are shown on Table 10, and reveal a high degree of similarity in activity preferences. As shown, the respondents indicated overwhelmingly that fishing is their number one activity and relaxation is their second most important activity during both the summer and winter seasons. These activity preferences indicate that the most important role Lac La Nonne plays on a local level is for fishing. Secondly, Lac La Nonne can be identified as an area "to get away from it all". Public perceptions such as outlined on Table 10, and their implications for the role of the lake, are important to future plans. Future plans allowing for some change, must be cognizant of the existing role of the lake and its importance to landowners and lake users.

ii) Problems

Landowner and lake user problems are outlined on Tables 11 and 12. Table 11, outlining lake and site conditions and perceived problems, indicates there is agreement regarding lake water quality problems. The public perceptions of lake water quality support the scientific analysis of water quality which indicates that Lac La Nonne is highly eutrophic. Site condition problems outlined on Table 11, do not appear to be as significant as the lake condition problems. Wave and ice erosion, and drinking water quality and quantity have been identified as site problems.

Table 12 indicates the public perception of road condition and property use problems. Respondents were less unanimous on this issue. Road dust, for example, is the main problem along the southeastern shore of the lake from the Williams to the Lac La Nonne subdivisions, whereas potholes appear to be a problem with most roadways except in the vicinity of Moonlight Bay and the Idle Hours subdivisions. Less than half of the subdivided areas outlined a problem with vandalism. Trespassing is a problem associated mainly with Mortensen and the Williams subdivisions but affects more than half of the rural landowners.

The public perceptions of the problems described on Tables 11 and 12, have also been confirmed by other information sources. For example, poor lake water quality has been identified as a problem through the public meeting process, the landowner and lake user questionnaires, and through scientific analysis indicating a high level of eutrophication. Future planning cannot ignore the perceived and verified problems associated with poor lake water quality at Lac La Nonne. Problems that have been identified by more than one source of information automatically take on added importance in the overall planning process.

ACTIVITY	SUMMER ACTIVITIES										WINTER ACTIVITIES				
ZONE	Summer Fishing	Summer Relaxation	Swimming	Power Boating	Summer Camping	Waterskiing	Summer Picnicking	Nature Study and Photography	Canoeing		Ice Fishing	Winter Relaxation	Cross-Country Skiing	Snowmobiling	Skating
Norseman	◒	●	○								◒	●	○		
Chrystyna	◒	●	○								◒	●	○		
Mortensen	◒	●	○								●	◒	○		
Williams	●	◒	○								◒	●	○		
Winkleman	●	◒	○								◒	●	○		
Lac La Nonne	●	◒	○								●	◒		○	
Moonlight Bay	●	○	◒								●	◒	○		
Moonlight Bay Est.	●	◒					○				◒	●	○		
Idle Hours	●	◒		○							●	◒	○		
Greendale	●	◒	○								●	◒		○	
White Rock	●	◒						○			●	◒	○		
Murray's Beach	●	◒		○							◒	○		●	
Rural Landowners	●	◒	○								●		◒	◒	○
Trailer Park Users	●	○			◒										
OVERALL RANKING	1	2	3	4	5	6	7	8	9		1	2	3	4	5

● Most Popular Activity
◒ Second Most Popular Activity
○ Third Most Popular Activity

TABLE 10 ACTIVITIES BY ZONE AT LAC LA NONNE

PROBLEM / ZONE	No. of Questionnaire Res.	LAKE CONDITION								SITE CONDITION						
		Algae Growth	Weed Growth	Lake Odour	Swimmer's Itch	Dirty or Polluted Water	Soft Lake Bottom	Small Beach	Rocky Beach	Ice or Wave Erosion of Shoreline	Inadequate Drinking Water Supply	Inadequate Drinking Water Quality	Poor Soil Conditions	Drainage Problems	Occasional Flooding by Lake	Unstable Building Site
Norseman (Birch Cove)	35	○	○	○	○	○				○						
Chrystyna	14	○	○	○	○	○	○			○		○				
Mortensen	12	○	○		○						○	○				
Williams	18	○	○	○		○	○	○		○						
Winkleman	20	○	○	○	○	○	○									
Lac La Nonne	29	○	○	○	○					○						
Moonlight Bay	46	○	○	○	○	○	○									
Moonlight Bay Est.	19	○	○					○								
Idle Hours	19	○	○	○	○	○	○	○								
Greendale	41	○	○	○	○	○										
White Rock	6	○	○	○	○	○	○		○	○	○	○			○	
Murray's Beach	6	○	○	○	○	○	○	○								
Rural Landowners	31	○	○													
Trailer Park Users	31	○	○													
TOTAL RESPONSES	327	275	273	158	150	138	118	84	48	72	56	52	34	33	30	7

○ indicates 50% or greater of zone respondents perceive condition as a problem.

TABLE 11 LAKE AND SITE PROBLEMS BY ZONE AT LAC LA NONNE

PROBLEM / ZONE	No. of Questionnaire Responses	ROADS AND TRAFFIC CONDITIONS									PROPERTY USE				
		Dust	Potholes	Noise	No Problems	Safety Hazards	Heavy Traffic	Lack of Speed Bumps	Lack of Sidewalks		Vandalism	Trespassing	Disturbances - Others too Close	Conflicts - Public and Beaches	Conflicts - Beach Use and Cottagers
Norseman (Birch Cove)	35														
Chrystyna	14		○												
Mortensen	12				○						○	○			
Williams	18	○	○								○	○			
Winkleman	20	○	○								○				
Lac La Nonne	29	○	○												
Moonlight Bay	46	○									○				
Moonlight Bay Est.	19														
Idle Hours	19														
Greendale	41		○												
White Rock	6		○	○							○				
Murray's Beach	6		○		○										
Rural Landowners	31		○									○			
Trailer Park Users	31	○	○												
TOTAL RESPONSES	327	175	161	88	81	54	36	35	21		101	99	45	25	21

○ indicates 50% or greater of zone respondents perceive condition as a problem.

TABLE 12 ROADS, TRAFFIC AND PROPERTY USE PROBLEMS BY ZONE AT LAC LA NONNE

3. Land Use Analysis

a) Settlement and Development History

The historical use and development of land at Lac La Nonne is an important planning factor. The following overview has been prepared to provide the reader with a complete historical perspective of the existing use and development at Lac La Nonne.

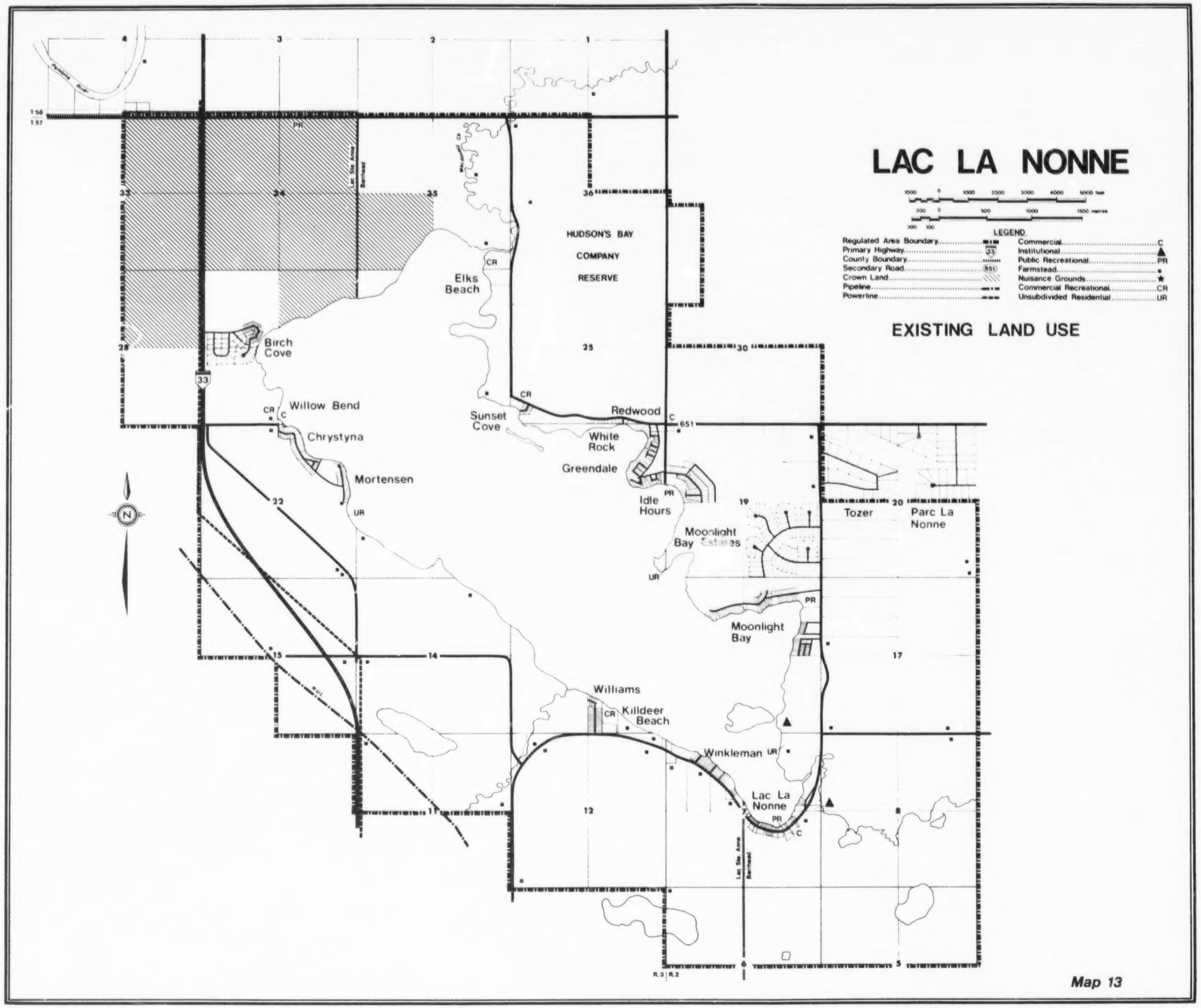
The exact derivation of the name Lac La Nonne is open to controversy. Some say it is from a Native translation meaning "white headed eagle". Others suggest that the lake was named after the nuns at Lac Ste. Anne, or after the common white winged scooter duck which resembles the nun's habit.

Lac La Nonne is located on the historic Belvedere Trail or the Klondike Trail. This trail was extensively used between 1825 and 1875, but by 1899, it had fallen into disrepair. The present Tozer Subdivision located on the NE 20-57-2-W5, has been designed so that a large park reserve preserves a portion of this historic trail (see Map 13).

The Hudson's Bay Company had had horse corrals at Lac La Nonne since the 1850's, and by 1860 had established a small winter post. A band of Native people settled near the HBC post, and as a result the Catholic priests established a small mission nearby. By 1881 this mission was moved to Riviere Que Barre. The Hudson's Bay Company Reserve shown on Map 13, marks the location of the former post.

Metis families also settled at Lac La Nonne. The Octave Majeau family moved from St. Albert in 1868, and settled and farmed on section 13-57-3-W5. By 1905, agricultural development was more widespread and a few summer cottages had also been built. Robert Hambling is credited with building the first summer cottage sometime between 1905 and 1910. At this same time, the Anglican Church and mission was established. St. Peter's Anglican Church, built in 1908, still stands at Lac La Nonne. It is located just east of the Lac La Nonne Store on the NE 7-57-2-W5. Negotiations are currently underway to declare St. Peter's a historic site. Our Lady of Lourdes Catholic Church was established on the west end of the lake in approximately 1905. It was eventually moved to the narrows and can be found at the present Camp Encounter site on the SE 18-57-2-W5 (see Map 13).

Lac La Nonne also has a history of logging and sawmill development. The first sawmill was established in 1908 near the present Winkleman's Beach area. Logging was also carried out at the west end of the lake during the 1918-1920 period, with the lumber being used for local buildings. Agricultural buildings and some resort cottages were built during this time. The first officially recorded subdivision for resort cottage development occurred in 1947. This initial subdivision and the subsequent subdivision history of Lac La Nonne, is shown in Figure 6.



LAC LA NONNE

EXISTING LAND USE

Map 13

1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Crown Land
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead ■
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
HUDSON'S BAY COMPANY RESERVE
Elks Beach
Birch Cove
Willow Bend
Chrystyna
Mortensen
Sunset Cove
Redwood
White Rock
Greendale
Idle Hours
Moonlight Bay Estates
Moonlight Bay
Tozer
Parc La Nonne
Williams
Killdeer Beach
Winkleman
Lac La Nonne
T.58
T.57
R.3 R.2
Lac Ste. Anne
Barrhead
4
3
2
1
33
34
35
36
28
25
30
22
19
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15
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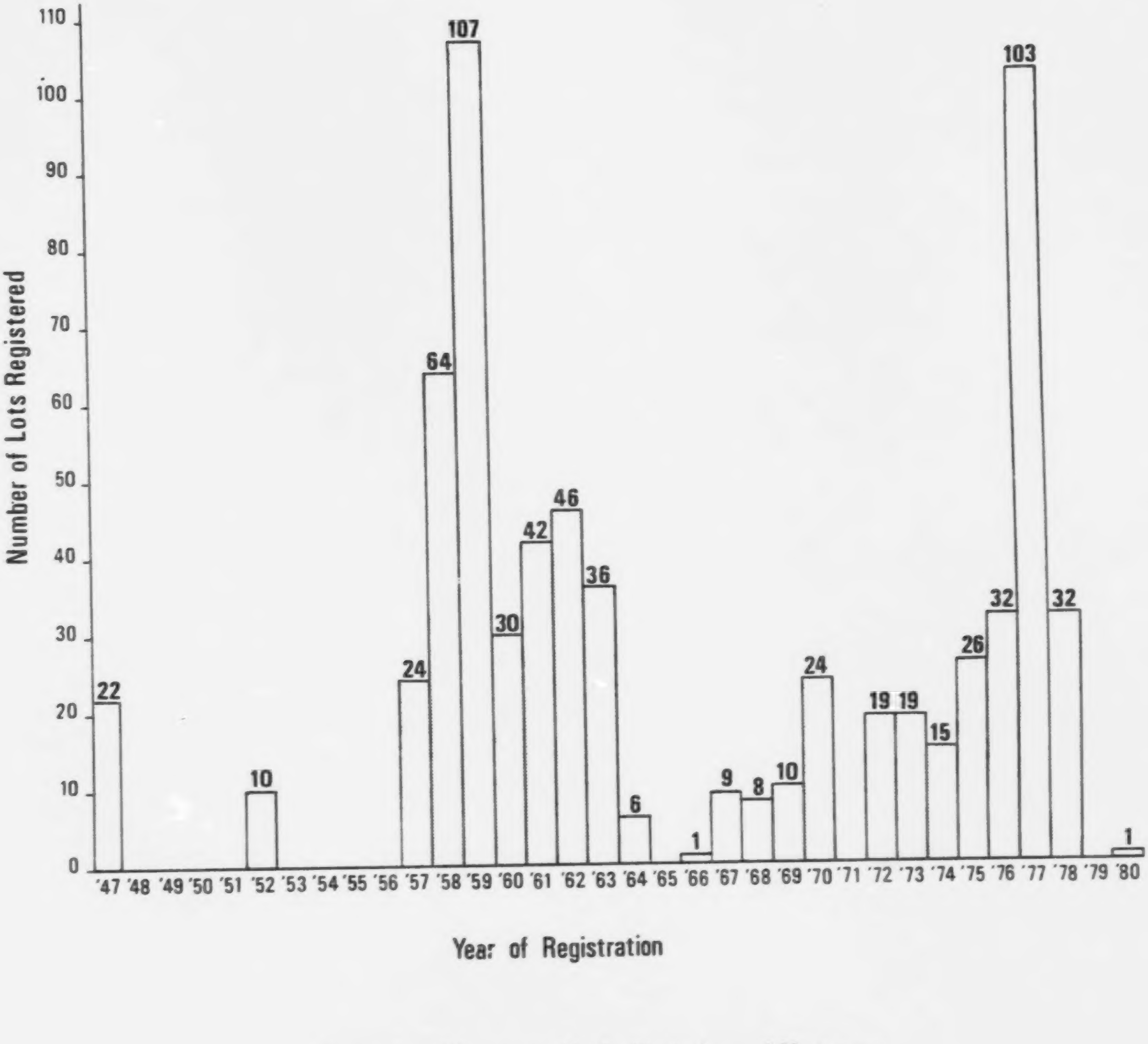

Lac La Nonne Subdivision History

FIG. 6

b) Existing Land Use

The existing use of land at Lac La Nonne can be categorized as follows:

- i) Residential Subdivisions
  - resort cottage subdivisions
  - country residential subdivisions
  - small farm and acreage subdivisions
- ii) Public Reserves and Access Points
- iii) Commercial Recreation Areas
- iv) Institutional Areas
- v) Agricultural and Natural Land Areas
- vi) Crown Lands
- vii) Transportation, Utilities and Other Services

The use of Lac La Nonne and its shoreland tends to be associated with the first four land use categories mentioned above: residential subdivisions; public reserves and access points; commercial recreation areas; and institutional areas. These land uses give rise to the majority of the local population, but do not represent the largest areas of land. Agricultural and natural land areas and Crown lands are the largest consumers of land, and are the areas with the highest potential for future change. The remaining land uses in the planning area can be associated with transportation, utilities and other services. All of these land uses are shown on Map 13.

i) Residential Subdivisions

There are 13 resort cottage subdivisions located on portions of 11 quarter sections surrounding Lac La Nonne, and 4 country residential subdivisions located in the backshore area. Small farm and rural acreage subdivisions are scattered throughout the planning area. Table 13 outlines the subdivided lots by zone in the Lac La Nonne planning area. The zone locations can be found on Map 13. In addition to these officially subdivided areas, there are a total of 16 resort cottages located on portions of 3 quarter sections surrounding the lake. These unsubdivided areas are also shown on Map 13.

The existing subdivisions at Lac La Nonne affect future land use allocation. One method of assessing this effect is to measure the amount of shoreline reserve with existing subdivisions that could be used by future backshore residents. Table 14 summarizes this assessment, by assigning 10 lineal feet of shoreline reserve for each backshore lot that may be developed in the future. This method assumes, however, that there are no site constraints. The actual quality of the shoreline combined with other site constraints will ultimately determine the amount of backshore development.

TABLE 13

SUBDIVIDED LOTS BY ZONE, LAC LA NONNE PLANNING AREA

LOT TYPE AND DESCRIPTION ZONE	Total Marketable	Developed	Undeveloped	Developed Shoreline	Undeveloped Shoreline	Reserve
Norseman (Birch Cove)	81	44	37	5	0	5
Chrystyna	30	27	3	26	1	7
Mortensen	23	19	4	16	0	1
Williams	37	25	12	5	0	1
Winkleman	24	24	0	24	0	4
Lac La Nonne	43	43	0	27	0	4
Moonlight Bay	103	92	11	57	3	4
Moonlight Bay Est.	78	12	66	0	0	4
Tozer	29	2	27	0	0	7
Parc La Nonne	30	4	26	0	0	1
Idle Hours	58	45	13	5	1	4
Greendale	96	87	9	40	6	8
White Rock	11	10	1	10	1	3
Murray's Beach	9	8	1	1	0	1
Rural Acreages	26	13	13	5	0	0
TOTAL	678	455	223	221	12	54

A second method of assessing the impact of existing development is to compare the number of lots in the planning area, with the water surface area of the lake.* This method assumes that every subdivided lot within the planning area will require 10 acres of surface water for recreational use. In general, lakes with less than 10 acres of water surface available for each subdivided lot are perceived as approaching an overcrowded situation. At Lac La Nonne, the present level of developed lots indicates that 6.7 acres of water surface are available for each lot. If all lots are developed, this figure drops to 4.5 acres of lake water per lot. From this assessment, it appears that Lac La Nonne may already be overcrowded.

A third method of assessing the impact of existing subdivisions upon the natural and social environments is to measure user days. A user day is defined as the impact made by one user engaged in any activity at any time during one day (a family of 4 at a cottage for 7 days, 4x7=28 user days). Applying this definition to the number of developed lots at Lac La Nonne results in an assessment of existing impact. Applying this same definition to the number of undeveloped lots, provides an assessment of future impact. User day calculations are shown on Table 15. User days have been assigned to subdivided and unsubdivided lots, public reserves, commercial recreation areas, institutional areas and agricultural farmsteads. The development of Table 15 is explained in more detail in the appendices. It should be pointed out that Table 15 assesses future impact by extending the present situation. Calculations have not been made to determine the user day impact should all of the seasonal lots be converted to permanent residences. From Table 15, the following interpretations have been made:

- residential subdivisions are only developed at 47% of their capacity
- residential subdivision/commercial recreation development ratio (existing) is 1.3 to 1
- residential subdivision/commercial recreation development ratio (if all vacant residential lots are developed and commercial recreation remains the same) is 1.[illegible] to 1
- existing private to public development ratio (includes all land use categories on Table 15) is 1.6 to 1
- future private to public development ratio (includes all land use categories on Table 15) is 2.4 to 1

The above interpretations indicate that if all vacant lots are developed at Lac La Nonne, existing use and population could more than double (100% growth potential). Also, the ratio of private to public development changes in favour of the private land owners as more vacant lots are developed by private individuals. All of these factors have to be considered when future land use allocation decisions are made that affect Lac La Nonne.

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* Alberta Municipal Affairs methodology

TABLE 14

AVAILABLE SHORELINE RESERVE FOR FUTURE BACKSHORE DEVELOPMENT BY ZONE

ZONE	TOTAL LOTS	EXISTING BACK-SHORE LOTS	EXISTING LAKE-SHORE RESERVE (Lineal Ft.)	RESERVE (Ft.)/ BACKSHORE LOTS	NUMBER OF FUTURE BACK-SHORE LOTS
Norseman (Birch Cove)	81	81	1590	19.6	78
Chrystyna	30	0	292	-	29
Mortensen	23	5	487	97.4	43
Williams	37	32	137	4.3	0
Winkleman	24	0	832 (includes road allow.)	-	70
Lac La Nonne	43	13	265 (includes road allow.)	7.8	0
Moonlight Bay	103	41	1218	29.7	81
Idle Hours	58	53	209	3.9	0
Greendale	96	50	786	15.7	29
White Rock	11	0	259	-	26
Murray's Beach	9	6	100	16.7	4
				TOTAL	360

ii) Public Reserves and Access Points

Lac La Nonne's public reserves result from the subdivision process, which usually takes a portion of land as public reserve every time an application for subdivision is approved. There are 54 reserve lots at Lac La Nonne (see Table 13). Field experience has indicated that two of these reserves are used primarily by members of the public who do not own land in the vicinity of the lake. The most frequently used reserve is located across the road from the Lac La Nonne General Store on the SE 7-57-3-W5. Picnic tables, a boat launch and a pier are located in this area. Camping is not permitted, although it does occur in some instances. The second reserve used by the general public is located at the end of the road allowance within the Idle Hours Subdivision. This area has a boat launch and two picnic tables (see Map 13). Table 15 shows the user day calculations for these two areas.

iii) Commercial Recreation Areas

Commercial recreation areas offer lake access and a few facilities to the general public. At Lac La Nonne, there are a total of 4 commercial recreation areas.

Elks Beach, located on the SE 35 and NE 26-57-3-W5, has a total of 270 trailer or recreation vehicle sites. The majority of these sites are rented to the public at large on a yearly basis. The area also has 12 picnic sites that are available to the travelling public on a daily rate basis. A concession, a general store, a boat launch and a pier have also been completed over the last few years and future expansion is not anticipated.

Sunset Cove, located approximately one mile south of Elks Beach on the SE 26-57-3-W5, has 40 camping sites. These sites are rented on a daily or weekend basis, but at present, not rented on a monthly or yearly basis. Sunset Cove also rents 18 boats and 10 low horsepower outboard motors at an hourly rate. Weekend users are also provided with a boat launch, pier and general store. Expansion plans are not anticipated in the immediate future.

Killdeer Beach is situated on the south shore of Lac La Nonne on the SE 12-57-3-W5. There are a total of 135 sites for recreation vehicles or holiday trailers that are leased on a monthly or yearly basis. For the travelling public, Killdeer Beach has approximately 20 picnic sites that are rented on a daily basis. The same number of non-power boats are also available for rent on a daily basis. A boat launch, two piers, boat gas concession and a restaurant have also been established at Killdeer Beach.

Willow Bend is located on the western shore of Lac La Nonne on the SE 27-57-3-W5. At present, there are 30 sites that are leased on a yearly basis to holiday trailer owners. An additional 30 sites are available with expansion plans currently being undertaken. Details regarding expansion are not available at this time.

The impact of commercial recreation areas on the social and natural environment is shown in the user day calculations in Table 15.

iv) Institutional Areas

At Lac La Nonne there are two institutional uses of land. They are St. Peter's Anglican Church located on the NE 7-67-2-W5, and Camp Encounter which includes Our Lady of Lourdes Catholic Church located on the SE 18-57-2-W5. Sunday services are held on a regular basis at St. Peter's Anglican Church. Our Lady of Lourdes Catholic Church holds services during the summer season only. Camp Encounter is presently used by small family groups and youth groups during the weekend. Expansion plans include the building of an all-season lodge that can accommodate 60 to 80 people. Existing and potential impact in user days is shown on Table 15.

v) Agricultural and Natural Land Areas

Agricultural land use such as pasture or cropping, and natural lands consisting of treed areas under private ownership that are usually assessed as agricultural non-farm, consume more than half of the land in the planning area - approximately 7,000 acres. These areas have the greatest potential for future land use change. Pressure for future subdivision development for country residential, resort cottage or condominium development, will naturally occur in the existing agricultural areas that are not subdivided at this time.

The impact of rural landowners upon the social and natural environment is shown in the user day calculations of Table 15. It must be kept in mind that cattle have a significant impact, especially upon the natural environment, although cattle and other farm animals have not been included in the user day calculations. The impact of cattle and other animals has, however, been included in the water quality analysis section of the management study. The user days shown on Table 15 refer to the impact of human habitation on farmsteads. Expansion of agricultural operations is not anticipated for the immediate future. However, if expansion does occur, provision must be made for adequate buffering between conflicting land uses such as recreational or residential areas.

vi) Crown Lands

Crown lands owned by the Province of Alberta occupy 9 quarter sections northwest of Lac La Nonne. Three of these quarter sections are grazing leases. A cross country ski trail called the Yukon Trail, is located within the area of Crown land. User day impact is expected to be minimal from these areas of Crown land and, as a result, they have not been included in Table 15. In the future, Crown lands are expected to be used more intensively by the general public. It is anticipated that the Provincial Government will actively pursue the possibility of developing public day use and overnight areas on these Crown lands.

TABLE 15

EXISTING AND FUTURE USE OF THE [illegible] LA NONNE PLANNING AREA **
(in user days*)

RESIDENTIAL SUBDIVISIONS	EXISTING Summer	EXISTING Winter	EXISTING Total	VACANT LOTS AND PLANNED DEVELOPMENT Summer	VACANT LOTS AND PLANNED DEVELOPMENT Winter	VACANT LOTS AND PLANNED DEVELOPMENT Total
Norseman (Birch Cove)	8,536	4,092	12,628	7,178	3,441	10,619
Chrystyna	5,238	2,511	7,749	582	279	861
Mortensen	3,686	1,767	5,453	776	372	1,148
Williams	4,850	2,325	7,175	2,328	1,116	3,444
Winkleman	4,656	2,232	6,888	0	0	0
Lac La Nonne	8,342	3,999	12,341	0	0	0
Moonlight Bay	17,848	8,556	26,404	2,134	1,023	3,157
Moonlight Bay Estates	7,288	6,728	14,016	40,086	37,002	77,088
Tozer	1,215	1,121	2,336	16,399	15,137	31,536
Parc La Nonne	2,429	2,243	4,672	15,791	14,577	30,368
Idle Hours	8,730	4,185	12,915	2,522	1,209	3,731
Greendale	16,878	8,091	24,969	1,746	837	2,583
White Rock	1,940	930	2,870	194	93	287
Murray's Beach	1,552	744	2,296	194	93	287
Rural Acreages	2,522	2,421	4,943	2,522	2,421	4,943
Unsubdivided Cottages	3,104	1,488	4,592	0	0	0
	98,814	53,433	152,247	92,452	77,600	170,052
PUBLIC RESERVE AND ACCESS POINTS	1,037	11	1,048	0	0	0
COMMERCIAL RECREATION	113,750	3,360	117,110	0	0	0
INSTITUTIONAL AREAS	3,300	300	3,600	6,120	3,840	9,960
AGRICULTURAL AND NATURAL LAND AREAS	19,656	18,869	38,525	0	0	0
TOTALS:	236,557	75,973	312,530	98,572	81,440	180,012

Total Existing Use:	312,530
Total Future Use:	180,012
Grand Total (existing & future)	492,542

NOTE: These figures do not make provision for conversion of seasonal lots to permanent lots

* User Day is a standard measurement of use referring to the impact made by one user engaged in any activity at any time during one day, ie. a family of 4 at a cottage for 7 days, 4x7=28 user days. Calculations based upon questionnaire returns, field surveys, personal communication and air photos.

** see Appendix C for user day calculations.

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vii) Transportation, Utilities and Other Services

Transportation*

Highway 33 is the major road access to Lac La Nonne. It runs in a north-south direction west of the lake. Secondary Roads 651 and 650 provide access from the east and the southeast (see Map 13).

Except for Highway 33, road construction and maintenance are the joint responsibility of the local municipalities and Alberta Transportation. Counties determine priorities for work, but Provincial grants are essential to the program's execution. Provincial priorities are highly influential in final project selection and funding.

Two counties are involved around Lac La Nonne - Barrhead on the east side and Lac Ste. Anne on the west side. Each county has developed road programs. The 1981 program which has been approved for the County of Barrhead plans re-gravelling along two routes. The first is on SR 651 east of the lake from NW 20-57-2 to the County boundary at NE 22-57-1, a total of nine miles. Re-gravelling is also planned for local roads southeast of the lake beginning at NW 8-57-2 and proceeding east three miles to NE 10-57-2, south two miles to SW 2-57-2 and east six miles to the County boundary at SE 3-57-1. In addition, a special grant has been approved to oil roads from Highway 33 in the County of Lac Ste. Anne around Lac La Nonne. This project will proceed from the junction of Highway 33 and SR 650 east one mile, north two miles, southeast two miles to Lac La Nonne, then north two and one half miles to SR 651, and finally two miles to Sunset Cove.

The County of Lac Ste. Anne is concentrating on re-constructing SR 765 north of Darwell and SR 633 west of Darwell. Other than the oiling project on the access road to Lac La Nonne from Highway 33 already mentioned, no work is planned around Lac La Nonne in the next few years.

It has been proposed that 10-20 miles of SR 651 (the east access from Highway 2 north) will be re-constructed in 1981. This work has not been confirmed as yet, nor the section of the road the project will involve. Road programs are confirmed yearly and priorities do change. Alberta Transportation usually controls the funding and administers the contract, in this area, out of the Regional Office in Barrhead.

Utilities

Natural gas, electricity, and telephone services are available to Lac La Nonne area residents. A Northwestern Utilities gas pipeline runs southeast through part of the planning area, about 2 km south of, and parallel to, the south shore of Lac La Nonne (see Map 13). The Lac La Nonne planning area is serviced by the Ste. Anne Natural Gas Co-op. An urban flat rate is applied against landowners with a lot size of less than one acre and where more than six properties in close proximity request the service. Where the request is from fewer properties, or the properties are greater than one acre in size, a rural flat rate applies which is more than double the urban rate. Questionnaire returns indicate that 22% of the landowners utilize natural gas service. Within subdivisions, propane is used more frequently than natural gas probably because cottages and seasonal use buildings outnumber permanent residences. In the rural zone, the majority of landowners have natural gas hook-up.

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*Note: some of the roadways mentioned are outside the boundaries of the land use map.

Calgary Power provides electricity to the entire area by 8 K.V. or 14.4 K.V. primary lines and secondary distribution lines. The landowner pays for secondary lines at a cost of approximately $1000.00 for a lot adjacent to an existing serviced area. Construction costs for additional primary lines to service new subdivisions would vary from approximately $8000.00 per mile on relatively flat terrain to approximately $16,000.00 per mile on hilly or treed land. The landowners survey indicated two-thirds of the landowners at Lac La Nonne have electricity.

Alberta Government Telephones (A.G.T.) services the area. Twenty two percent of the landowners surveyed have telephone service; the rural zone accounts for the greatest percentage of use.

Municipal Services

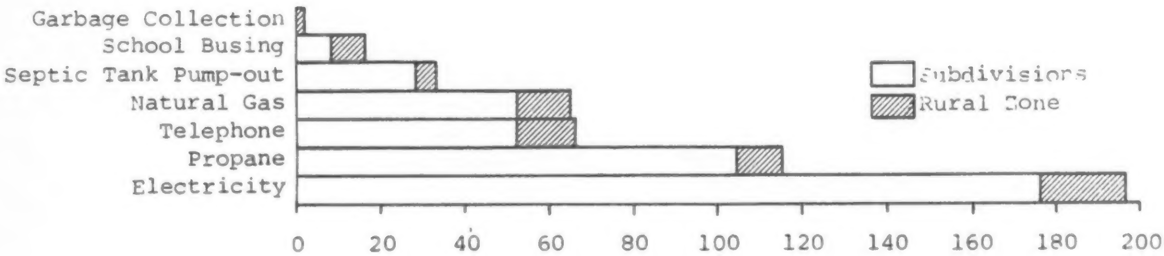
The permanent residents in the planning area are supplied with school busing service, but only 5% of the questionnaire respondents stated that they use the service and these are almost exclusively within the rural zones. Generally, it appears that there is little interest in improving the school busing service although Moonlight Bay Estates, a country residential subdivision, showed some interest in improved school busing and would be willing to provide some financial support.

Police protection is provided by the local detachment of the R.C.M.P. in Westlock. The Westlock detachment patrols the Lac La Nonne area on a routine basis and on request, and they indicate that it is not a problem area. Local residents indicate that they would like to see improved police protection.

Garbage collection service is utilized by a small percentage of rural landowners. The present capacity and life span of these grounds is not known, but additional landfill sites will be needed to accommodate the increase in country residences and year-round use of resort lots. A provincially funded grant is available to acquire land for regional landfill sites or regional sewage lagoon sites. The Lac La Nonne area could benefit from this program, which is not at a site selection stage. Additional sites could possibly be provided by contracting private organizations to operate commercial landfill sites. Alternatively, the developer of a subdivision could be encouraged to create and operate landfill sites, as well as sewage lagoons.

The following bargraph summarizes the use of various utilities and services in the area.

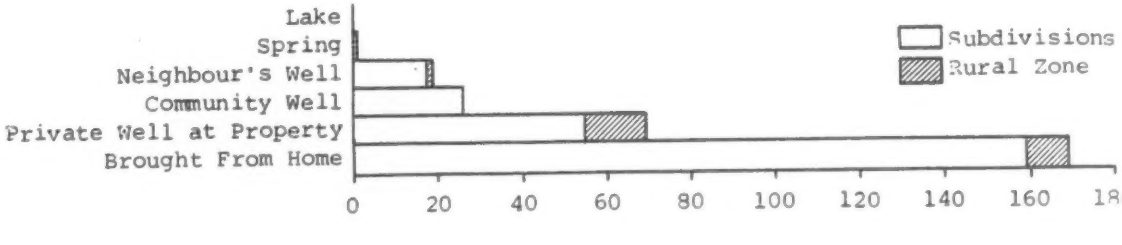
UTILITIES AND SERVICES



Drinking Water and Sewage Disposal

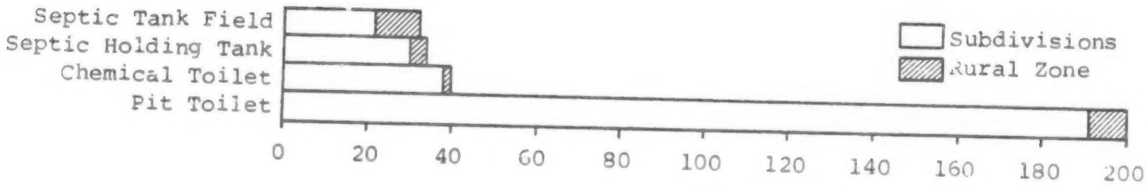
There are no piped systems for water supply or sewage disposal at Lac La Nonne. Many landowners bring drinking water from their permanent residence to their lake property. Approximately 25% of the landowners have private water wells on their property. Only 9% of the respondents use a community well. The following bargraph indicates the source of drinking water in relation to the number of surveyed households.

SOURCE OF DRINKING WATER

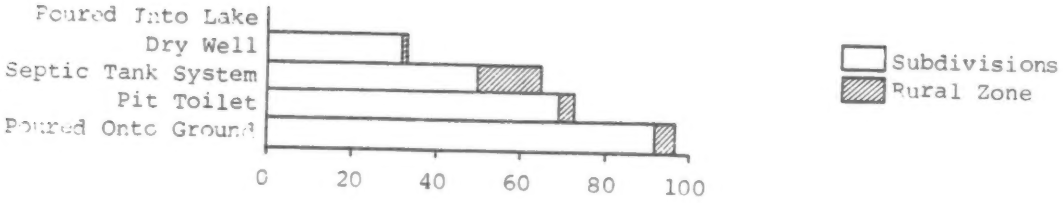


Sewage disposal can present health problems and can reduce lake water quality if the systems are not properly installed and adequately maintained. Two thirds of the landowners surveyed have pit toilets. A small percentage have septic tank and field systems, holding tanks or chemical toilets. Lac La Nonne, Moonlight Bay and the rural landowners make use of these last three systems. The bargraphs below indicate the type of sewage disposal systems and sink waste disposal systems in relation to the number of surveyed households.

TOILET WASTE DISPOSAL



SINK WASTE DISPOSAL



A minority of the people surveyed (21%) indicated that waste disposal methods need improvement. The proportion of lot owners who use pit toilets is large because of the high number of seasonal lot owners and because outdoor privies are inexpensive to build and require little maintenance. On a comparative scale, a pump-out holding tank costs approximately $1500.00 to install and incurs additional maintenance costs every time it is pumped out. In addition, the contractor who pumps out holding tanks should be hauling the sewage to a lagoon that is large enough to accommodate large volumes of grey and black water (a lagoon of this design does not exist in the immediate vicinity of Lac La Nonne). Septic tank and field systems are usually limited to larger lots. Existing regulations indicate a minimum lot size of 20,000 square feet, but local conditions usually require larger lots of 1 to 2 acres. Alberta Environment usually recommends 1 to 2 acre parcels if on-site sewage disposal is proposed. The cost of a septic tank and field systems requiring 400 to 600 feet of piping approaches $3000.00. This cost includes installation.

In addition to pump-out tanks and on-site sewage disposal, there are several other innovative possibilities for sewage waste disposal. The roto-disk system, which is a modified tank and evaporation mound system is being tested for small lots. A central field system in a clustered subdivision can be effective. Larger clustered subdivisions or high-density areas with a large permanent population, could benefit from a modified municipal system with lift stations and plumbing. These systems which could be a vacuum or a low pressure piped system, are not really economically feasible for the Lac La Nonne area in the foreseeable future due to the relatively small permanent population. Indications from the landowner survey are that present sewage disposal methods will basically remain unchanged. Currently, there are few permanent residents at Lac La Nonne and little indication is provided that conversions from seasonal to permanent use are rapidly increasing.

In summary, residents in the Lac La Nonne area have access to most utilities and social services. Natural gas, propane, electricity, telephone utility services are available. School busing, fire and police protection, garbage collection or disposal sites and sewage hauling services are provided. There are no piped systems for water supply or sewage disposal. Drinking water is obtained from a variety of sources, predominantly from private wells, or brought from a permanent residence. The majority of subdivision landowners use pit toilets for waste disposal because of the predominance of seasonal cottage use. A large proportion of the rural landowners have septic field systems.

c) Land Use Analysis Summary

It is obvious from the foregoing discussions that past, present and future uses of land next to Lac La Nonne are the main elements of a lake management plan. In order to effectively summarize this information, two spheres of influence have been considered. The first consideration is the influence of historical use and development of land. The lake management plan has to be sensitive to the presence of the Klondike Trail, its location and alignment. The religious significance is important in terms of the Anglican and Catholic Christian Faiths. It is important that the historical heritage of buildings and cemeteries be presented and it is also important to be aware of the Spiritual needs of the existing population. The historical patterns of land clearing for forestry and agricultural development must also be assessed in relation to their influence on present and future land use. Lakeshore subdivisions of the past affect a lake management plan by severely restricting lake access. Older subdivisions, consisting of a line of lots side by side along the shore of the lake, not only eliminate backshore access, but also give the appearance of an "urban" community, especially when viewed from the lake. The environmental impact of poorly designed subdivisions influence a lake plan in terms of sewage effluent that may be draining directly into the lake, wildlife and fish habitat removed through excessive vegetation clearing, or lack of groundwater quality and quantity due to contamination or over use of aquifers.

The second sphere of influence relates to the existing and future land use situation. Residential subdivisions influence the location of additional residential subdivisions through the established system of roadways, utilities and other services, and through the ownership of adjacent parcels of land. These adjacent lands are often owned by the developer of the original subdivision who may have formally or informally planned an expansion phase to the original subdivision. Residential subdivisions are often not developed to their original design limits. If full development occurs in the future, this may have a significant influence on the natural and social environments. Table 15 is one way in which existing and future impacts of residential subdivisions and other land uses at Lac La Nonne have been assessed in user days.

In addition to residential subdivisions, the impact of existing land use is evaluated on Table 15 in relation to commercial recreation and public reserves and access points. Generally, it appears that Lac La Nonne is used by the local and regional populace. Lac La Nonne is not used, to any great extent, by people travelling long distances. Regarding impact, future plans must consider who will be using the lake and shoreland, and what their needs and expectations will be.

Institutional use and development at Lac La Nonne is comparatively insignificant. Expansion plans for the Camp Encounter area are not expected to significantly increase the number of user days at the lake. In terms of environmental impact, the improved facilities will probably decrease the impact on the natural environment because of better sewage disposal methods.

Large areas of agricultural and natural lands hold the key for significant land use change in the future. Land use planning must take into account the existing agricultural soil capabilities, farmland assessment, rural community atmosphere and the role these lands play in an ever decreasing agricultural economy. Large scale land use changes from agriculture to recreation may eventually cause overcrowding and have severe impacts upon the social and natural environments. As well, valuable agricultural soils will be taken out of food production. Short term gains in terms of increased recreation and residential development and possible increases in revenue, must be weighed against such longer term losses as decreased recreational aesthetics, environmental impact, increased servicing expenditures, and disruption of the agricultural community and its far reaching economic ramifications.

Crown lands also have potential for future change. The Provincial Government appears willing to investigate the possibility of establishing public recreation areas on crown lands. If a need is shown that Lac La Nonne requires additional public access, the Provincial Government may respond by developing public recreation facilities. Future plans must make provision for this possibility.

Transportation, utilities and other services significantly influence the future plans for an area. The existing network of roads, electrical power, natural gas and telephone lines influence the developer who naturally wants access and services provided to newly subdivided and developed areas. Overall, it appears that Lac La Nonne has the services for future recreational or residential developments. Service extension costs vary which may influence development phasing to some degree. The existing method of sewage and sink waste disposal by the use of outdoor privies must be reduced to guard against severe environmental impact. The planning of new developments will avoid potential hazards by assessing on-site sewage disposal capabilities and directing future changes to areas of highest capability.

4. Municipal Financing

Overview:

The local government of a municipality administers local services by authority derived from Provincial Statutes such as The County Act, The Municipal Government Act, The Municipal Taxation Act, and The Planning Act.

Municipalities receive a large part of their local revenue from property taxes. Permanent residences, country residential properties and resort cottages are assessed at the current market value for that area. Property that qualifies as "farm" is assessed at the preferred rate for agricultural land. Business and commercial property is assessed at a higher rate.

If ratepayers in a part of a municipality request a special service which is not provided to all ratepayers, the Council, under Section 93 and 93.1 of The Municipal Taxation Act, can tax those ratepayers for the special service. This special or partial tax could be used when resort areas and summer villages, with increasing numbers of permanent residences, offer or consider offering services and utilities such as sewage disposal (lagoon and pump out tanks), garbage collection, police and fire protection.

A major concern of local administrators is the provision of adequate public services and utilities within a limited local annual budget. It is difficult to estimate expected local expenditures and revenues, and therefore, any further development (i.e., resort, country residential, small farm) has to be considered in the light of provision of services at a realistic and affordable cost to the municipality.

Additional sources of local revenue are:

- Grants-in-lieu-of taxes on crown property paid by the crown to the municipality;
- Services provided to governments;
- Internal sources:
    - licences and permits
    - fines
    - rentals
    - concessions and franchises
    - returns on investments
    - penalties and costs on taxes
- Grants and loans from other governments in the form of unconditional and conditional monies. Unconditional grants are subsidy payments to local communities to be spent at the discretion of the municipality. Conditional grants are payments to assist the municipality in expanding and maintaining local services and utilities, and are usually estimated on a per-capita basis.

Many grants are available from both Provincial and Federal Governments to assist municipalities in their operating and capital programs, but because each governmental department administers its own grants, it is easy for a municipality to miss out on grant money by not being aware of the grant. The following are some of the grants that may be useful to the municipalities.

UPDATE BASED ON 1980 PROGRAM

- Cost Shared Equipment (improving municipal emergency preparedness)

- Alberta Municipal Water Supply and Sewage Treatment Grant Program (sewer and water treatment)
- Solid Waste Management Assistance (provision of regional sanitary landfill sites)
- Community Services Program - Municipal Infrastructure Component (sewer and water projects)
- Financial Assistance for Water Management (water resource protection)

- Community Services Program - Neighbourhood Improvement Component (upgrading of older neglected neighbourhoods)
- Grants in Lieu of Taxes (exemption for crown property)
- Residential Land Assembly and Development (creation of land banks)

- Municipal Assistance Grant (unconditional assistance grant)
- Property Tax Reduction (reduction of residential/farm land property tax)

- Major Cultural/Recreational Facility Development (improvement or construction of facilities)
- Agricultural Societies Capital Grant (alleviate portion of costs, eg. of an arena or community hall)
- Operational Financial Assistance (aid community recreation operation costs)
- Project Co-operation (development of recreation programs and facilities)
- Provincial Parks Municipal Recreation Grants (helps defray operating costs of parks)
- Trail Development Financial Assistance Program (organized trail development)

- Police Phase-In Grant (subsidize R.C.M.P. policing)
- Summer Village Policing (subsidize policing in summer villages)

- Grants to Counties and Municipal Districts (improve road conditions in rural areas)
- Street Assistance (road and street improvements in towns, villages and summer villages)
- Alberta Hamlet Street Assistance

- Utilities Officer Program (rural areas utility officer subsidy)

- Devonian Grant (neighbourhood beautification program)

- Local Historic Resource Grant Program

5. Existing Plans, Policies and By-laws

The lake and shoreland of Lac La Nonne are currently subject to the influence of all levels of government, from the local to federal jurisdictions. However, a detailed listing and explanation of the numerous applicable statutes is beyond the scope of a lake management study. Instead, the management study will concentrate upon the existing plans, policies and by-laws that affect land use.

The regulation and control of land use within the Province of Alberta is primarily through the Provincial Planning Act, 1977. The implementation of a final lake management plan will be undertaken in accordance with the provisions of this Act, by the adoption of an official Area Structure Plan by By-law. Area Structure Plans are statutory plans designed to provide a framework for subsequent subdivision and development of an area of land within a municipality.

The description of the plans, policies and by-laws which follows is limited to subject titles. For more information regarding these policy areas, please refer to: The Draft Edmonton Regional Plan, Volume 2 and its subsequent amendments; County of Barrhead No. 11 Land Use By-law No. 50-79; County of Lac Ste. Anne No. 28 Land Use By-law No. 12-80; and the Subdivision Regulations of the Planning Act, 1977.

TABLE 16 EXISTING PLANS, POLICIES, AND BY-LAWS

Planning Commission and Municipalities Policies Affecting Future Land Use	Edmonton Regional Planning Commission	County of Barrhead	County of Lac Ste. Anne	Provincial Government
AGRICULTURAL LAND				
a. preservation of CLI agricultural Class 1, 2 or 3	●	●	●	
b. subdivision	●	●	●	
c. non-agricultural use	●	●	●	
d. building regulations		●	●	●
e. intensive animal operations		●		●
SAND, GRAVEL AND CLAY RESOURCES				
a. under agricultural lands	●		●	
b. reclamation of extractive operations	●		●	●
c. on or near recreational, historical, residential and environmental features	●			
d. under non-agricultural lands	●			
COAL, OIL AND GAS RESOURCES AND FACILITIES				
a. subdivision of land overlying	●			
b. under agricultural lands	●			
c. reclamation				●
d. setback distance from residential	●	●		
WATER RESOURCES				
a. subdivision near	●	●		
b. environmental protection against erosion, flooding, reduced water quality	●	●		
c. construction of piers				●

NOTE: This matrix only presents policy areas which regulate land use and future development in the Lac La Nonne Planning Area. Although the details of each policy are not available here, they have been considered in developing the plan alternatives.

TABLE 16 Cont.

Planning Commission and Municipalities Policies Affecting Future Land Use	Edmonton Regional Planning Commission	County of Barrhead	County of Lac Ste. Anne	Provincial Government
FISH AND WILDLIFE RESOURCES				
a. Wildlife Protection Areas and subdivision within these areas	●			●
b. private and public wildlife habitat conservation	●	●		●
c. fisheries habitat				●
NATURE CONSERVATION, OPEN SPACE AND OUTDOOR RECREATION				
a. recreational land designation	●			●
b. reclamation of abandoned resource extraction areas	●		●	
c. location of highways/utilities or sanitary landfill	●	●		●
d. provision for through subdivision reserves	●			
LAKE SHORELANDS				
a. environmental protection	●			●
b. public access	●		●	
c. subdivision design and servicing	●		●	●
SUBDIVISION AND COUNTRY RESIDENTIAL LAND USE				
a. location:				
1. on non-agricultural land	●	●	●	
2. near Summer Villages	●		●	
3. near resource extraction	●			
4. in important wildlife habitat	●			●
5. groundwater quality and availability	●	●		●
b. road access		●	●	
c. conservation of rural environment	●	●	●	
d. provision of servicing costs (eg. offsite levy)	●	●	●	

TABLE 16 Cont.

Planning Commission and Municipalities Policies Affecting Future Land Use	Edmonton Regional Planning Commission	County of Barrhead	County of Lac Ste. Anne	Provincial Government
e. sanitary facilities		●	●	●
f. subdivision design and density (including public access and parcel size)	●	●	●	
g. building regulations		●	●	
h. demand		●		
i. mobile homes	●	●		
j. condominium developments	●	●		
RESORT SUBDIVISIONS				
a. in designated areas	●	●		
b. near lake	●	●	●	●
c. land capability	●	●		
d. subdivision design and access	●	●	●	
e. building regulations		●	●	●
f. sanitary facilities	●	●	●	●
TRANSPORTATION / UTILITIES				
a. protection of agricultural land	●	●		
b. environmental protection re: noise and air pollution	●			●
c. transportation/utility corridors	●	●		●
d. location of right-of-ways to minimize disruption	●		●	●
e. land use change requiring upgrading of secondary road		●		
f. development restrictions in vicinity of roads		●		
HISTORICAL AND ARCHAEOLOGICAL RESOURCES				
a. preservation		●		●
CROWN LAND	●			●
COMMERCIAL (MOTELS, SERVICE STATIONS				
a. site and building requirements		●		

6. Recreation Demand and Future Development

Recreation demands and future development pressures had led to the preparation of a lake management plan. At Lac La Nonne, these pressures and demands will be evaluated in two ways: through extrapolation of the current situation; and, through attempts to predict what may occur in the future.

Extrapolations will occupy the majority of the following discussion. The existing and possible future of Lac La Nonne will be evaluated in light of questionnaire returns relating to long term plans and management proposals, boating activity observations and calculations, a regional recreation demand analysis, and assessment of population growth trends. Unforeseen events are discussed in the last section dealing with the role of the lake.

a) Long Term Plans and Management Proposals

Questionnaire respondents were asked about their long term (5-10 year) plans for the land they owned at Lac La Nonne. Table 17 summarizes these responses. Over the short term, the majority of landowners intend to continue their present use of the land. Longer term plans indicate that landowners will continue to winterize their present dwellings or construct cottages that are suitable for year round use. Construction of cottages for summer use only or construction of homes for permanent habitation, does not appear to be a likely trend in the immediate future at Lac La Nonne. Similarly, a low percentage of the respondents appear to be interested in establishing a commercial business, applying for subdivision, or selling their property. Only 9% of the total respondents were undecided about the future of their property holdings. For the most part, it appears that property owners are content with the present situation.

Respondents were also questioned in regard to their support for different management proposals. Table 18 summarizes these responses. Management proposals are divided into three categories: lake and land use controls; service improvements; and, capital improvements. Overall, many people are not only willing to support given proposals, but are also willing to lend their financial support to ensure proposal implementation. As an example, weed control appears to be the most important management proposal, with roughly 43% of the total respondents willing to lend their financial support for implementation of a weed control program. The ranking of land use zoning in seventh place in a list of nine proposals is interesting since the major implementation portions of the final lake management plan will involve land use zoning. To the planner, land use zoning is of paramount importance since it constitutes major portions of the final plan, but to the local landowner, zoning of land appears to be of lesser importance, with roughly 17% of the total respondents willing to financially support the implementation of such a program. The remaining management proposals are shown on Table 18. The two most important proposals in each of the three management proposal categories on Table 18 are: weed control and protection of wildlife; police protection and garbage disposal; and roads and public beach clean-up. Proposals of this nature should be addressed in a lake management plan for Lac La Nonne.

LONG TERM PLANS / ZONE	No. of Questionnaire Responses	Continue Present Use	Winterize Present Cottage	Convert Present Cottage to Permanent Home	Build Cottage for Summer Use	Build Cottage for Year Round Use	Build Permanent Home	Establish Commercial Business	Establish Institutional Use	Apply for Subdivision	Sell one or more lots Within Existing Subdivision	Undecided
Norseman (Birch Cove)	35	◐	○	○	○	○	○				○	○
Chrystyna	14	◐	○	○		◐					○	○
Mortensen	12	◐	○									○
Williams	18	◐		○		○						○
Winkleman	20	●	○	○		○						○
Lac La Nonne	29	●	○		○		○	○		○		○
Moonlight Bay	46	◐	○	○	○	○	○			○	○	
Moonlight Bay Est.	19	○	○	○		○	○	○			○	○
Idle Hours	19	◐	○	○		○	○			○	○	○
Greendale	41	◐	○	○	○	○					○	○
White Rock	6	◐	◐				○			○		
Murray Beach	6	●										
Rural Landowners	31	◐	○	○	○	○				○	○	○
TOTAL RESPONSES	296	171	28	20	14	32	13	4	0	10	11	26

○ indicates low interest and/or response,	1-33%
◐ indicates medium interest and/or response,	34-66%
● indicates high interest and/or response,	67-100%

TABLE 17

LONG TERM PLANS BY ZONE AT LAC LA NONNE

MANAGEMENT PROPOSAL / ZONE	# Questionnaire Responses	SUPPORT LAKE AND LAND USE CONTROLS																	
		Weed Control	$ Support	Protection of Wildlife Habitat	$ Support	Firearm Discharge Control	$ Support	Water Quality Improvement	$ Support	Boat Speed Restrictions	$ Support	Water Surface Zoning	$ Support	Land Use Zoning	$ Support	Stronger By-law Enforcement	$ Support	Water Level Regulation	$ Support
Norseman (Birch Cove)	35	○	○	○	○	○		○	○	○		○		○		○			
Chrystyna	14	○	○	○	○	○	○	○	○	○		○	○	○		○	○	○	○
Mortensen	12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Williams	18	○	○	○	○	○	○	○	○	○	○			○		○	○	○	
Winkleman	20	○	○	○	○	○	○	○	○	○				○		○		○	○
Lac La Nonne	29	○	○	○		○		○		○				○		○			
Moonlight Bay	46	○	○	○		○	○	○	○	○	○	○		○		○		○	
Moonlight Bay Est.	19	○	○	○	○	○	○	○	○	○		○		○	○	○	○		
Idle Hours	19	○	○	○	○	○	○	○	○	○	○			○	○	○	○	○	○
Greendale	41	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
White Rock	6	○	○	○		○	○	○	○	○		○							
Murrays Beach	6	○	○	○	○	○		○	○	○	○			○	○	○		○	○
Rural Landowners	31	○		○		○		○		○									
Trailer Park Users	31	○		○				○											
TOTAL RESPONSES	327	247	142	223	103	200	72	199	115	179	65	175	107	143	57	132	68	114	56

MANAGEMENT PROPOSAL / ZONE	# Questionnaire Responses	SUPPORT SERVICES IMPROVEMENTS									
		Police Protection	$ Support	Garbage Disposal	$ Support	Waste Water Disposal	$ Support	Sewage Treatment	$ Support	School Busing	$ Support
Norseman (Birch Cove)	35	○		○							
Chrystyna	14	○	○	○	○						
Mortensen	12	○	○								
Williams	18	○	○	○	○	○	○	○			
Winkleman	20	○	○								
Lac La Nonne	29	○									
Moonlight Bay	46	○	○								
Moonlight Bay Est.	19	○	○	○	○	○	○	○	○	○	○
Idle Hours	19	○	○	○	○	○	○				
Greendale	41										
White Rock	6	○	○								
Murrays Beach	6	○	○	○	○	○	○	○	○		
Rural Landowners	31										
Trailer Park Users	31										
TOTAL RESPONSES	327	140	80	90	49	77	41	71	41	25	17

MANAGEMENT PROPOSAL / ZONE	# Questionnaire Responses	SUPPORT CAPITAL IMPROVEMENTS															
		Roads	$ Support	Public Beaches Clean-up	$ Support	Hiking & Skiing Trails	$ Support	Marking of Navigational Hazards	$ Support	Public Docks	$ Support	Public Campgrounds and Picnic Areas	$ Support	Road Lighting	$ Support	Pedestrian Walkways	$ Support
Norseman (Birch Cove)	35			○	○	○		○		○		○					
Chrystyna	14	○															
Mortensen	12	○	○	○	○												
Williams	18	○	○	○	○	○		○		○		○		○			
Winkleman	20	○	○	○													
Lac La Nonne	29	○	○					○	○								
Moonlight Bay	46	○	○	○				○									
Moonlight Bay Est.	19	○	○	○	○	○				○	○	○					
Idle Hours	19	○	○	○	○			○	○	○	○						
Greendale	41	○	○	○	○			○									
White Rock	6	○	○														
Murrays Beach	6	○	○	○				○		○						○	
Rural Landowners	31																
Trailer Park Users	31	○		○													
TOTAL RESPONSES	327	166	89	144	63	104	51	101	46	98	47	71	26	47	29	24	13

○ indicates 50% or greater of zone respondents were supportive of proposal

TABLE 18

MANAGEMENT PROPOSALS BY ZONE AT LAC A NONNE

b) Boating Activity

Boating activity at Lac La Nonne will be evaluated from three perspectives. The first perspective is called the theoretical calculation. Basically, it involves an assessment of the numbers and sources of boats at the lake and relates that to the amount of lake surface available for boating. The second assessment of boating activity is called the observed calculation. It includes actual field observations of boating activity and acts as a double check on the theoretical calculation. The third evaluation is obtained from the questionnaire returns, and includes an assessment of boating activity from the perspective of local landowners. By combining these three perspectives of boating activity at Lac La Nonne, an attempt will be made to relate the recreational use of the lake (present and future) with the possible changes in land use that may generate additional activity on the lake surface.

TABLE 19 BACKGROUND INFORMATION FOR BOATING CALCULATIONS*

Land Use

Total Number of Subdivided Residential Lots in Planning Area	678
Total Number of Developed or Occupied Lots	455
Total Number of Undeveloped Lots	223
Total Number of Commercial Recreation Sites (no expansion anticipated)	537
Total Number of Institutional Sites	32
Total Number of Additional Institutional Sites Planned	48
Public Reserves Used by the Public at Large	2

Boat Ownership

Resort Cottage Subdivisions	1.40	boats/landowner
Country Residential and Rural Acreage Subdivision and Farmsteads	1.37	boats/landowner
Public Recreation Areas	1.01	boats/rec. site
Institutional Area	0.18	boats/rec. site
Public Reserves	0.85	boats/group

Number of Boats at Lac La Nonne

	Existing	Potential
From Subdivided Residential Lots	637	
From Unsubdivided Residential Lots		312
From Commercial Recreation Areas	542	
From Existing Institutional Area	6	
From Expanded Institutional Area		9
From Public Reserves (on a peak day)	5	
TOTALS	1,190	321

Total Boats (Existing and Potential) 1,511

TABLE 19 Cont.

Lake Surface Available for Boating

The water surface of Lac La Nonne available for boating was determined by eliminating areas of extensive aquatic vegetation along the shoreline as well as areas less than 1.5 metres in depth, from the total surface area of the lake. The resulting surface area available for boating is .... 2,509 acres

* Land Use information obtained from registered plans of survey, field records, aerial photos and personal communications.
Boat Ownership information obtained from landowner, trailer owner and lake user questionnaires, field observations and personal communications.

i) Theoretical Boat Density Carrying Capacity

The theoretical boat density capacity compares the number of boats that are generated from existing resort cottage and country residential subdivisions, commercial recreation areas, institutional developments, public reserves and surrounding rural lands, with the amount of water surface available for boating at Lac La Nonne.

The purpose of this calculation is to estimate the theoretical number of boats that would be on the lake at a peak use time. Based upon a literature review of boating, it has been assumed that 20% of all boats in the planning area may be in the water at a given peak time, and that an average of 10 acres of water surface is required per boat.

Lake Surface Area Available for Boating	2,509 acres
Lake Surface Capacity for Boating @ 10 acres per boat	251 boats
Theoretical Number of Boats at Existing Level of Development (20% of total boats)	238 boats
Theoretical Number of Boats if all potential Development Occurs (20% of total boats)	302 boats

From the above calculation, it appears that at peak use times, Lac La Nonne may have 238 boats on its surface. These boats represent 95% of the lake's boating capacity. If all potential development occurs in the planning area, Lac La Nonne does not appear to have the capacity to accommodate the number of boats that may be on the lake surface during a peak use day. A comparison of boat use to future land use development, suggests that Lac La Nonne would be unable to accommodate the type of development that would generate additional boating use.

ii) Observed Boat Density Carrying Capacity

The observed boat density capacity compares the number, type and recreation activity of each boat on Lac La Nonne observed during boating surveys, with the amount of water surface available for boating.

A survey of boating activity at Lac La Nonne was conducted during two summer weekends (July 19 and 20, and August 2, 1980). Figures 7 and 8 and Map 14 summarize the results of these surveys. From the observed peak day, the following calculations have been made.

Boating Activity Percentage	Max. Acreage of Total Surface Water Consumed (of 2,509 acres)	Space Activity* Requirement Acres/Boat	Maximum Number of Boats
48% leisure boating	1,204	20	60
32% fishing	803	10	80
20% waterskiing	502	20	25
		TOTAL	165

* Reiner Jaakson, Amma and Christopher Lakes Study

From the background information, it was estimated that Lac La Nonne had the water surface capacity to accommodate 251 boats. The observed calculation shown above refines this approach by applying observed percentages of boating activity, and by assigning different space requirements for the activities that were recorded. The end result of the observed calculation is that Lac La Nonne appears to have a maximum capacity to accommodate 165 boats.

The actual observations of boating activity at Lac La Nonne on a busy day reveal that 151 boats were on the lake's surface during a peak hour. If this observed peak is compared with the capacity of the lake's surface to accommodate boats at 10 acres per boat (calculated at 251 boats), it appears that Lac La Nonne is currently used at 60% of its capacity. Using the refined observed calculation of 165 boats, it appears that Lac La Nonne is used at 92% of its available capacity. In summary, it appears that Lac La Nonne is presently being used somewhere between 60 to 92% of its boating capacity. Comparing observed boating activities and future development potential, it appears that Lac La Nonne has a limited capacity to accommodate the type of development that would generate additional boat use. However, it must be kept in mind that Lac La Nonne may only be used at peak boating capacity for two or three days during the whole year.

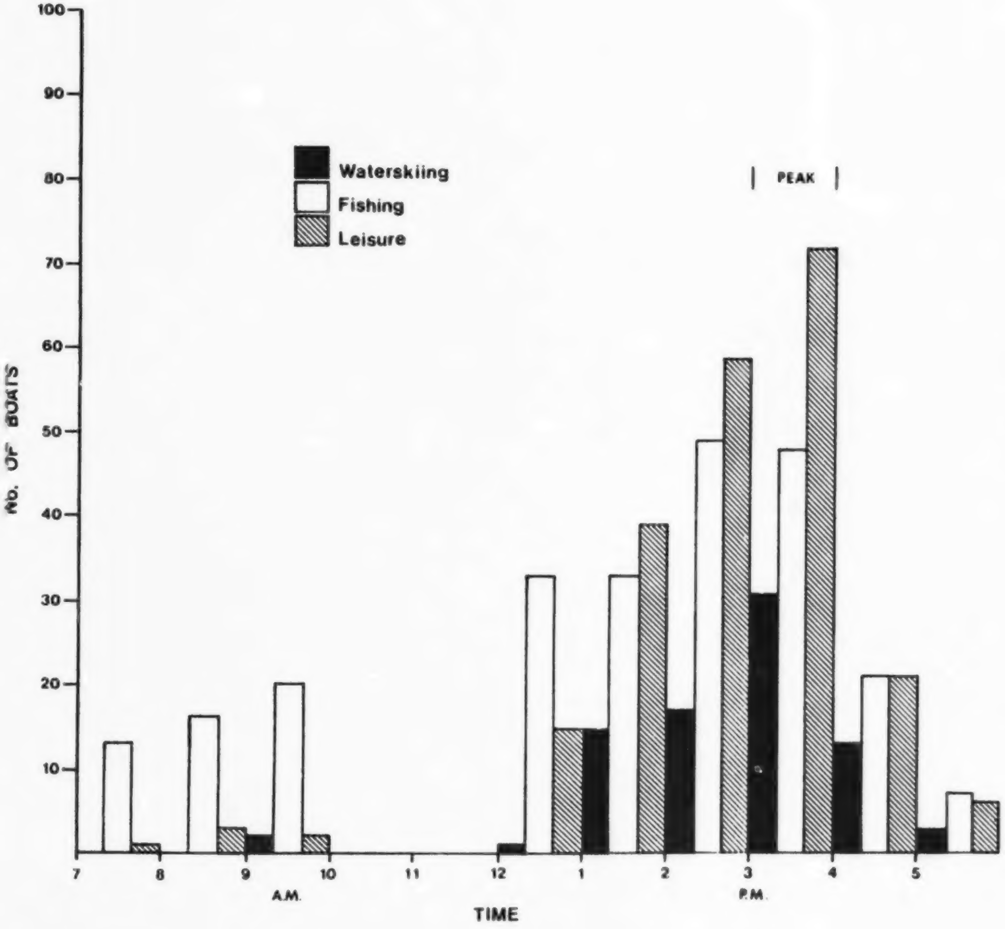


FIG.7 LAC LA NONNE BOATING, 20 JULY, 1980.

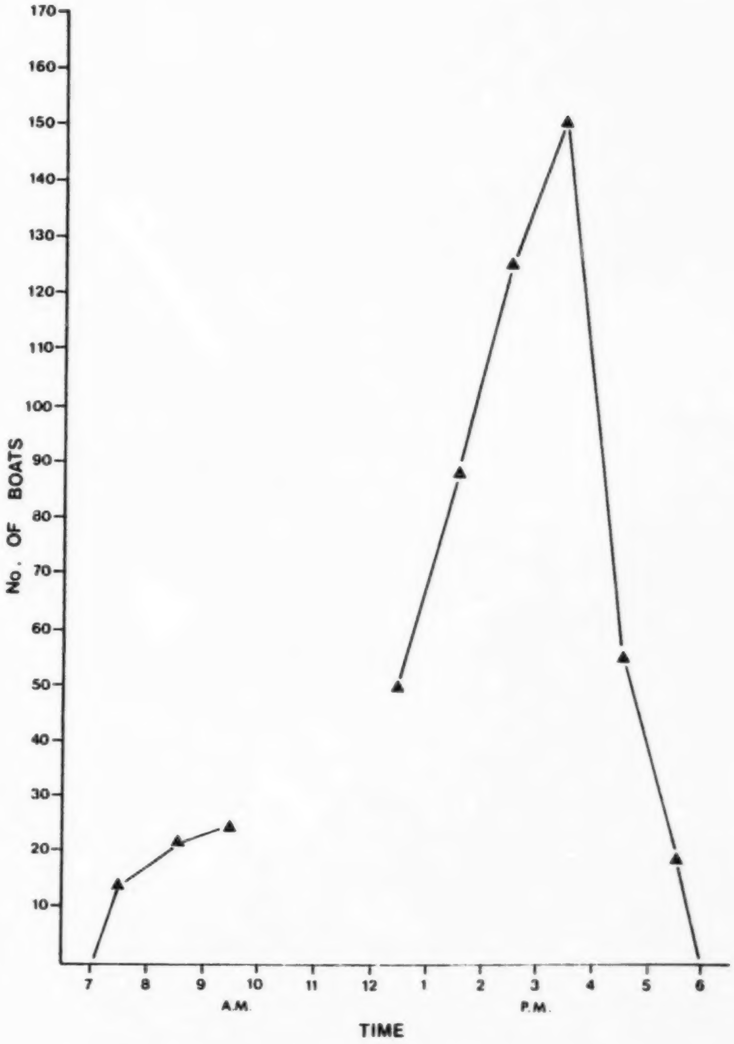
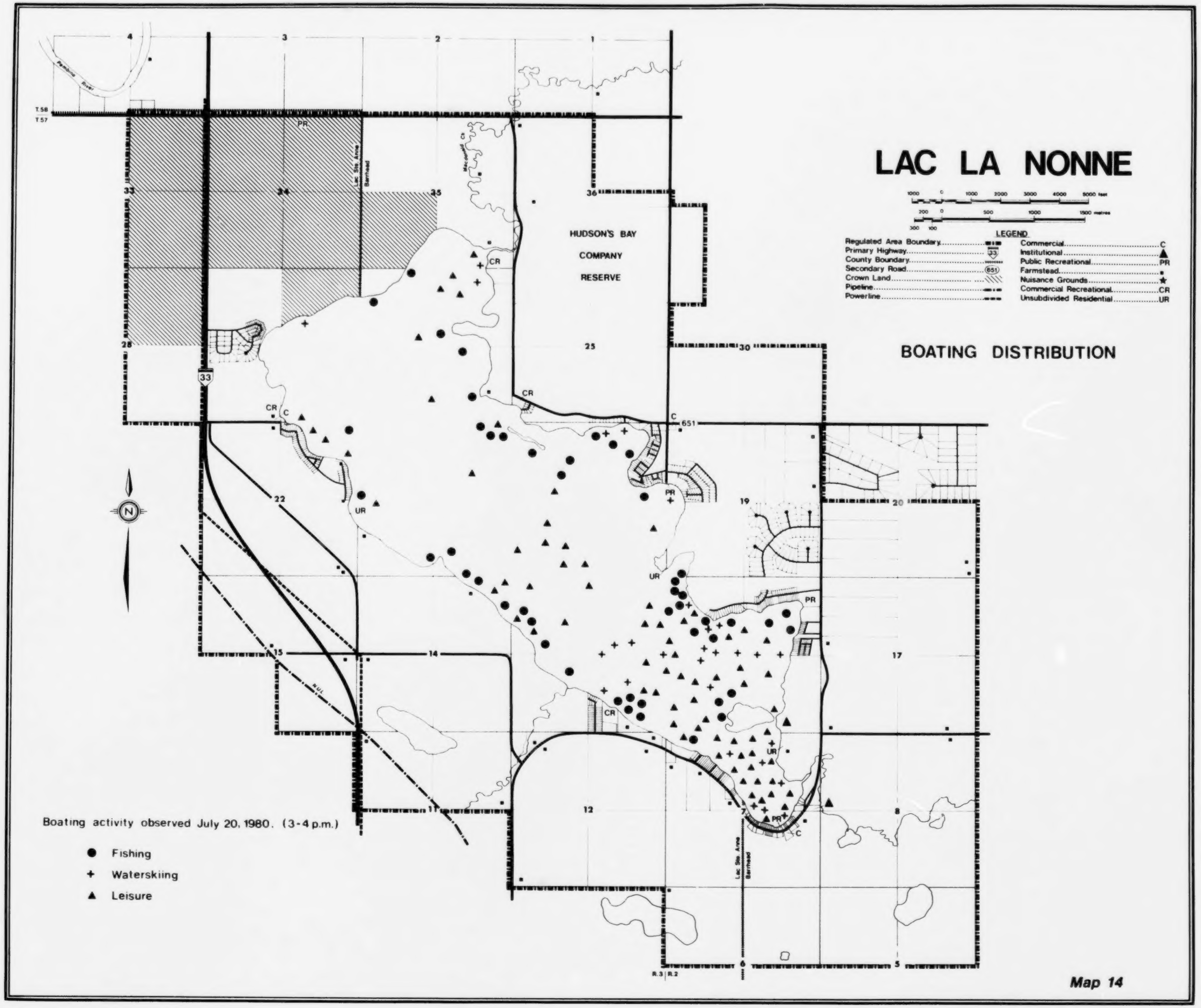


FIG. 8 LAC LA NONNE PEAK BOATING, 20 JULY, 1980.

LAC LA NONNE

BOATING DISTRIBUTION


1000 0 1000 2000 3000 4000 5000 feet
200 0 500 1000 1500 metres
300 100
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Crown Land ▨
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead •
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
HUDSON'S BAY COMPANY RESERVE
T.58
T.57
R.3
R.2
Lac Ste Anne Barrhead
Pembina River
N
33
651
PR
CR
C
UR
1
2
3
4
5
6
7
8
11
12
14
15
17
19
20
22
24
25
28
30
33
35
36
Fishing ●
Waterskiing +
Leisure ▲

Boating activity observed July 20, 1980. (3-4 p.m.)

Map 14

iii) Public Perceptions of Boating Activity

The public perception of boating activity provides a third evaluation of boating on Lac La Nonne. These perceptions are often based upon years of experience and are valuable in providing a public perspective on the theoretical and observed calculations. From Table 20, which summarizes the public perception of boating at Lac La Nonne, it appears that the most intense use of the lake for boating occurs during long weekends. The majority of zone respondents indicated that the surface of Lac La Nonne is over used for boating during these long summer weekends. This perception from the public standpoint, endorses the conclusions of the theoretical boat calculation that, during peak hours, the surface of the lake is approaching maximum capacity. Table 20 also highlights the areas where the most intense boating activities occur: Williams; Moonlight Bay; and, Lac La Nonne Subdivisions. These perceptions support the observations made of boating activity and recorded on Map 14.

In summary, it appears that the theoretical and observed boating calculations generally agree with the public's perception of boating activity on the lake surface. In addition, it may also be pointed out that public perceptions are based upon existing development, whereas the theoretical and observed calculations take into account potential development that may occur on vacant lots. All three perspectives on boating at Lac La Nonne seem to indicate that during peak use times, the surface of the lake is very close to its boating limit or is already over used. These calculations and observations, which attempt to relate the recreational use of the lake with surrounding land use, suggest that Lac La Nonne has a very limited capacity to accommodate the type of land use change that would generate additional boat use.

c) Recreation Demand Analysis

In the course of preparing the lake management plans in the Edmonton Region, staff undertook the preparation of a regional recreation demand analysis. The main purpose of this investigation was to provide additional insight into existing trends and their possible effects on the future of the region's lakes. The basis tenets of this study are:

i) Population growth, recreation participation rates, availability of recreation areas, equipment ownership, and the current standard of living suggest that the demand for all forms of outdoor recreation, but particularly, intensive water-based recreation activities such as swimming, boating, powerboating and fishing is likely to increase.

ii) The stabilization in overnight camping dema~~nd in~~ the Edmonton Region, and the availability of day use recreation opportunities in and surrounding Edmonton, indicate a greater use of Lac La Nonne for powerboating, fishing and related shorezone day use.

PERCEPTION / ZONE	Number of Questionnaire Responses	LAKE SURFACE BOATING USE								
		WEEKDAYS			WEEKENDS			LONG WEEKEND		
		Under Used	Adequately Used	Over Used	Under Used	Adequately Used	Over Used	Under Used	Adequately Used	Over Used
Norseman	35	◑	◑	○	◔	◑	◑	◔	◔	◑
Chrystyna	14	◑	◑	○	◔	◕	◑	◔	◑	◑
Mortensen	12	○	◕	○	○	◕	◔	○	◑	◑
Williams	18	○	◕	◔	○	◑	◑	○	◔	◕
Winkleman	20	◑	◑	○	○	◕	◔	○	◕	◑
Lac La Nonne	29	◑	◑	◔	○	◕	◔	○	◑	◑
Moonlight Bay	46	◑	◑	◔	○	◕	◑	◔	◑	◕
Moonlight Bay Est.	19	◑	◔	○	○	◑	◔	○	◑	◔
Idle Hours	19	◑	◔	○	◔	◕	○	◔	◑	◑
Greendale	41	◑	◑	○	◔	◑	◑	◔	◑	◑
White Rock	6	◑	◑	○	○	◕	◑	○	◑	◑
Sunset Cove	6	◔	●	○	○	●	○	○	◕	◑
Rural Landowners	31	◑	◔	○	◔	◑	◔	◔	◑	◑
Trailer Park Users	31	◑	◑	◔	◔	◕	◔	○	◑	◕
Total Responses	327	111	125	5	17	173	83	14	114	150

Response Percentage (%):

0	1-25	26-50	51-75	76-100
○	◔	◑	◕	●

TABLE 20 LAKE SURFACE BOATING USE BY ZONE AT LAC LA NONNE

iii) Preferred user destinations and travel survey results indicate recreation demand at lakes will be regional in origin and destination specific. Little tourist use is expected to occur at Lac La Nonne.

iv) Economic trends, projections of a proportionately older population and early retirement, indicate an increased use of resort cottages on a year-round basis and increased recreation demand for winter recreation opportunities such as walking and ski trails.

d) Population Growth

The Edmonton Planning Region population has grown from 400,000 in 1961 to 660,000 in 1978. The median age of the present population is a youthful 26.1 years. The population is aging, however, with the number of people aged 65+ doubling by the year 2000. The number of people aged 0-19 will decline. Projected population for the year 2001 is in the neighbourhood of one million people.

The City of Edmonton, within a driving time of 1.5 hours from Lac La Nonne, is expected to have a major impact on the lake due to its projected growth in population from 490,000 at present to 705,000 in the year 2001. Towns in the vicinity of Lac La Nonne should experience growth during this period also.

Population changes in number and composition are the result of two components of growth - natural increase and net migration (movement from other areas to the region). In 1961, much of the population growth in the region could be attributed to natural increase, whereas in 1976, more than half of the population growth was a result of net migration. If this trend continues, there will be increasing growth in the older age segment of the population with these people demanding more recreation space.

As a result, regional and local population growth, in combination with change in age composition due to net migration, will undoubtedly increase recreational user pressure on Lac La Nonne in the future.

e) The Role of Lac La Nonne

It was stated at the begining of this section that recreation demand and future development would be evaluated from two perspectives. The first perspective involves the extrapolation of known or perceived trends. The second involves an assessment or prediction of future eventualities. Both assessments involve the development of an opinion on the role of Lac La Nonne.

The foregoing sections, a) to d), primarily involved an extrapolation of the current situation and seem to indicate that Lac La Nonne will continue in its present role of serving the recreational needs of the local and regional population. This emphasis is not likely to change, although some growth is expected in recreational use of the lake and shoreland and in permanent residents. Lac La Nonne is not viewed as a provincially significant area that will attract large numbers of users who live outside the region, or tourists who are travelling through the province. With regard to other human uses of the lake and shoreland, Lac La Nonne does not appear to be an area of highly productive agricultural soils. Extensive areas for food production such as cereal grain fields, do not exist in the area. Although important for forage cropping and beef production, the existing agricultural activities appear stable and significant growth in the agricultural community is not expected. However, the conversion of existing agricultural lands to more densely populated recreational or permanent residential uses, has to be viewed cautiously. This type of change may eventually lead to the general degradation of the amenities that attracted the people initially, not to mention the loss of food producing lands next to the lake. In addition, incremental loss of lower quality agricultural soils in the Province may eventually result in a provincial deficiency in beef producing and forage crop areas.

Fossil energy resources such as coal, oil or gas do not appear to be provincially significant at Lac La Nonne. Mining for coal or drilling for additional oil and gas reserves is not anticipated.

The provincial significance of Lac La Nonne's fish and wildlife resources, appears to be important for local populations only. The area does not have extensive tracts of land and water that, in combination, would produce a unique or large enough animal habitat worthy of provincial preservation.

The existing and perceived trends indicate that Lac La Nonne plays an important role both locally and regionally, with the most important aspect of this role being related to the use of the lake for water-based recreation.

The continuation of Lac La Nonne's role as an area that primarily serves local and regional water-based recreational needs, is based upon a number of assumptions. Unforeseen events that may affect this role relate to: decreased recreational use caused by radical increases or decreases in the price of energy; increased recreational growth potential caused by moderate increases in the price of energy; or, increased permanent resident growth caused by government decentralization.

In conclusion, Lac La Nonne's role as an area that serves the water-based recreational needs of the local and regional population, is based upon a number of assumptions. Future plans must take into account the role of the lake as well as the possibility that this role may change.

IV MANAGEMENT STUDY CONCLUSIONS AND DEVELOPMENT CAPACITY

A. Introduction

The Lac La Nonne Management Study contains an analysis and an interpretation of biophysical and socio-economic information. The information contained in the Management Study is designed to be used as ready reference material. The Plan Alternatives for Lac La Nonne are, and the eventual Final Plan will be, primarily based upon the information analyses and interpretations contained in the Management Study.

The conclusions that follow have been derived from the analysis and interpretation of the information contained in the Management Study. They include written text, four key maps and eight tables. To obtain more information regarding the development of these conclusions, please refer to the main text of the Management Study.

B. Biophysical Conclusions

1. Lake Water Quality

a) Current nutrient inputs from agricultural activities within the direct watershed area should be investigated, and where inputs to the lake can reasonably be controlled, remedial action should be taken.

b) Future increases in nutrient inputs to the lake should be reduced by means of the following:

   i) Any further clearing of forested lands within the watershed, particularly in areas adjacent to the lake and influent water courses, should be kept to a minimum.

   ii) New subdivisions, commercial developments and agricultural operations should be carefully planned to minimize their impact, i.e. ensure proper sewage disposal and handling of animal wastes.

   iii) Lac La Nonne is highly eutrophic which may have some bearing on its desirability for increased water-based recreation.

2. Groundwater

a) The limited amount of available information indicates that groundwater quantity is not a significant limitation to future land use change.

b) The same information indicates that groundwater in the Lac La Nonne area usually requires treatment for sodium, bicarbonates or iron to obtain acceptable quality standards. These quality factors could prove to be a limitation when future land use change is contemplated.

3. Vegetation and Wildlife

a) Map 5 in the management study shows the areas of mixed forest, aquatic and wet bog vegetation in combination with soil, water erosion hazard. Those areas with severe water erosion hazard, in combination with extensive stands of vegetation, present severe limitations to future land use change. Vegetation clearing should be minimized in these areas or undertaken in such a manner that prevents water erosion from occurring.

b) Wildlife and fish habitat areas are best identified by the areas of vegetation shown on Map 5. Terrestrial vegetation clearing should be minimized or undertaken in a manner that provides wildlife corridors. Aquatic vegetation clearing should be minimized to maintain fish habitat. Waterfowl habitat areas do not appear to be significant at Lac La Nonne.

4. Soils Analysis for Future Land Use

a) Map 9 in the management study shows the residential development potential of the planning area. Very severe, severe and moderate to slight limitations on residential development are outlined. These same restrictions apply to areas considered for future intensive recreational development.

b) Map 9 presents one of the most important factors in the allocation of future land use adjacent to Lac La Nonne. Areas with moderate to slight limitations should naturally be the first to be considered for future land use change.

5. Arable Soils

a) Map 12 in the management study, shows the soil capability for agriculture combined with the municipal farmland assessment. Areas with class 3 soils, in combination with high farmland assessment, are considered valuable farmland and should not be considered for future land use change.

b) Areas with high farmland assessment but lower CLI soil capability, will also be considered valuable farmland. In these instances, farming practices have overcome soil deficiencies.

c) Areas with class 3 soil capability, in combination with low or non-existent farmland assessment, may be considered valuable farmland if the area is cleared and currently used for agricultural production. Class 3 soil areas that are currently not farmed and are covered with extensive stands of natural vegetation, will not be considered valuable farmland.

c. Socio-Economic Conclusions

1. Public Perceptions

a) The two information exchange meetings and the landowner, trailer owner and lake user questionnaires have provided considerable insight into people's perceptions and opinions of Lac La Nonne. Table 10 from the management study, summarizes the preferred activities at Lac La Nonne. These activities are arranged in accordance with summer and winter activity preferences and have an overall ranking applied to them. For both summer and winter seasons, fishing and relaxation are by far the most important activities. Activity preferences and their ranked importance provide guidance for future land use change.

b) Questionnaire respondents were also asked for their perception of problems related to lake and site conditions, and roads, traffic and property use. Table 11 in the management study, summarizes the responses regarding lake and site problems. Poor lake water quality is the most widespread problem at Lac La Nonne. This concern has also emerged from the scientific analysis of lake water quality and, as a result, has to be considered an integral part of any final plan that is developed for the lake. Table 12 in the management study, which highlights the problems and concerns related to roads, traffic and property use, reveals a lack of unanimity on the part of the residents. Concerns vary in accordance with the area where the respondents live. As a result, recommended solutions to these problems will have to be addressed to the specific areas in question. Special account will have to be taken of these when major land use changes are proposed to overcome an existing problem. Tables 11 and 12, therefore, will be used in relation to land use changes that may increase or decrease known problems.

2. Land Use Analysis

a) The historical use and development of land in the vicinity of Lac La Nonne affects land use planning primarily from the perspective of preserving history in the form of trails, buildings and cemeteries.

b) The number of existing subdivided lots and their level of development also influences future land use change. Table 13 in the management study, shows the subdivided lots by zone in the Lac La Nonne planning area. From this table, the area is presently developed at 67% of its total capacity and existing development potential has to be considered before additional land use change is allowed in the vicinity of the lake. Older subdivision designs also influence future planning in relation to access and environmental impact. Lake access for newly developed areas may be limited or non-existent. The existing subdivided areas may be poorly sited and result in groundwater and/or lake water pollution. Preserving or maintaining the region's history and designing new areas for subdivision or development, has to be undertaken in accordance with the former land use and development pattern.

c) Table 14 in the management study, presents one method of assessing the impact of existing land use on future land use development.* Ten lineal feet of shoreline reserve has been assigned to every backshore lot that may be developed in the future. With this assessment, it appears that the Williams, Lac La Nonne and Idle Hours Subdivisions do not have the capacity to accommodate additional backshore development. The remaining subdivisions, however, appear to have some backshore subdivision or development capacity. This evaluation, however, does not take into consideration the physical capability of the land to withstand future development.

d) A second method of assessing the impact of existing development is to compare the number of lots in the planning area, with the water surface area of the lake.** This method assumes that every subdivided lot within the planning area will require 10 acres of surface water for recreational use. In general, lakes with less than 10 acres of water surface available for each lot are perceived as approaching an over crowded situation. At Lac La Nonne, the present level of developed lots indicates that 6.7 acres of surface water per lot are available. If all vacant lots are developed, this figure drops to 4.5 acres per lot. From this assessment, it appears that Lac La Nonne may already be over developed.

e) A third method of assessing the impact of existing subdivisions is to measure the number of user days.*** Table 15 in the management study includes all of the user day calculations. From this table, the following interpretations have been made:

- residential subdivisions are only developed at 47% of their capacity (Table 13 indicated a 67% development level, see b) above);
- the existing residential subdivision/commercial recreation development ratio is 1.3 to 1;
- the future (if all vacant lots are developed) residential subdivision/commercial recreation development ratio will be 1.5 to 1;
- the existing private to public development ratio (all land use categories) is 1.6 to 1; and
- the future private to public development ratio (all land use categories) is 2.4 to 1.

As indicated, assessing the level of development at Lac La Nonne varies in accordance with the approach that is taken. From Table 15, it appears that existing use and population at Lac La Nonne could more than double (100% growth potential). Also, the ratio of private to public development increases in favour of the private landowner as more lots are developed by private individuals. In addition, Table 15 indicates that within the entire planning area, 31% of the residential subdivisions are within the County of Lac Ste. Anne and 69% are within the County of Barrhead. All of these factors must be considered in the planning process.

* Pigeon Lake Study, Edmonton and Battle River Regional Planning Commission

** Alberta Municipal Affairs Methodology

*** A user day is a standard measurement of use (i.e.) a family of four at a cottage for 7 days, 4x7= 28 user days.

f) Agricultural and natural land areas hold the key to future land use change. The potential of these areas for change from a biophysical perspective is outlined on Map 9 in the management study, while Map 12 outlines those areas that should be considered for continued agricultural production.

g) Crown lands also have land use change potential. The Provincial Government may develop public recreation facilities on Crown lands that are maintained as natural areas.

h) Lac La Nonne is well serviced by the existing network of transportation, utilities and related services. These factors do not appear to be a limitation on future land use change. However, it may influence the direction of future development.

i) Map 13 in the management study, outlines the existing land use pattern at Lac La Nonne. This map forms the basis for all future plans. All of the land uses mentioned above are shown on this map.

3. Municipal finances and existing plans, policies and by-laws also affect future plans at Lac La Nonne. The financial capability of the local municipalities has to be considered before future land use changes that may result in extensive capital investments for municipally operated parks, sewage lagoons, water systems or landfill sites are planned. Similarly, future land use proposals have to be weighed against regulations, policies and by-laws that are currently in place. A final lakemanagement plan may also include recommendations for amendments to the existing regulations.

4. Recreation Demand and Future Development

a) The long term plans (5-10 years) of the Lac La Nonne residents are summarized on Table 17 in the management study. Overall, it appears that property owners are content with the existing situation. From this perspective, very little change in land use is anticipated.

b) Management proposals that may form portions of a final lake management plan were presented to landowners and trailer owners at Lac La Nonne. A summary of the responses is shown on Table 18 in the management study. Many people were not only willing to support the various proposals, but also willing to give financial backing to ensure that the proposals were implemented. The support shown for the twenty-one proposals outlined on Table 18 will guide the development of the plan alternatives and an eventual final plan for Lac La Nonne.

c) Boating activity at Lac La Nonne has been evaluated from three perspectives. These detailed assessments of boating are an attempt to relate the recreational use of the lake surface to existing and future land use. The theoretical and observed calculations and the public perception of boating have been combined. These combined evaluations indicate that the surface of Lac La Nonne is being used at close to, or above, its capacity to accommodate present boating use during peak days. Projections of future development within established subdivisions, which would entail additional boating use, may cause some overcrowding on the lake surface during peak use days. If existing and potential boating use are related to future land use change, Lac La Nonne appears to have a very limited capacity to accommodate the type of land use change that would create additional boating activity.

d) The recreation demand analysis indicates that:

i) water-based recreation activity will increase;
ii) powerboating, fishing and related shorezone day use will be the basic components of this water-based recreation activity;
iii) the area will serve the local and regional populace with little tourist use expected; and,
iv) year-round use of resort cottages will increase.

e) Population growth in the Edmonton Region to approximately 1.1 million people in the year 2001, is expected to create more pressure for recreational use and development on the shores of Lac La Nonne.

f) Lac La Nonne's role has been identified as an area that serves the water-based recreational needs of the local and regional populace.

V EVALUATION AND ASSESSMENT OF MANAGEMENT STUDY AND ITS CONCLUSIONS

The information contained in the Lac La Nonne Management Study has been analyzed, interpreted and summarized. If viable and appropriate plan alternatives and an eventual final area structure plan for Lac La Nonne are to be prepared, then they must reflect the analysis and interpretations of the information contained in the study.

In an attempt to effectively evaluate and assess this information, three basic criteria will be used. These criteria are:

a) management goals and objectives;
b) development capacity, including limitations, constraints as well as opportunities; and,
c) important issues, problems and other factors which influence the formulation of a plan, but are separate from a) and b).

A. Management Goals and Objectives

The planning process established for Lac La Nonne involved the preparation of an initial document entitled: Lac La Nonne, Background Information and Management Issues. This report was reviewed by the respective municipal councils and given authorization for public distribution. Following public distribution, two public meetings were held to obtain public input at the beginning of the planning process.

Public and Municipal Council review of the initial report has provided the basis for the preparation of more detailed plan alternatives for Lac La Nonne. One way in which to interpret this guidance is to establish basic goals and objectives. Goals and objectives were prepared by the planning team after the initial public meetings. They provide the basic framework for the preparation of the management study and the plan alternatives.

The following goals and objectives formulated for Lac La Nonne are based upon an initial assessment of the biophysical and socio-economic factors, Municipal Council review and guidance and general public input. It is anticipated that the majority of these goals and objectives will be officially endorsed by the Municipal Councils at the time of area structure plan adoption. It is important to remember that while goals and objectives are desirable, it may not be possible to fully achieve all of them in the final area structure plan. All goals and objectives will be addressed, but the degree to which they can be achieved is dependent upon the type of area structure plan that evolves from the planning process. Obviously, the needs and expectations of everyone with an interest in the lake cannot be completely satisfied. Therefore, the following goals and objectives attempt to address as many areas of concern as possible. The plan alternatives will bring forth the importance of placing emphasis on different goals and objectives.

1. Management Goals

a) The role of Lac La Nonne has been identified as a lake serving the water-based recreational needs of the local and regional population. This role should be maintained and, if possible, improved by the preparation of a lake management plan.

b) To maintain and, if possible, improve the quality of the natural environment.

c) To maintain and, if possible, improve the quality of the social environment, especially in relation to the area's rural character and its recreational experience.

d) To establish a development capacity for the lake and its shoreland and to ensure that future development in the planning area will not result in use levels beyond this development capacity.

e) To develop a lake management plan that will provide guidance to the local municipalities responsible for its implementation.

In order to make these general goals more specific and definable, the following objectives were formulated. These objectives are:

2. Management Objectives

a) To encourage the development of areas suitable for public recreation use and to maximize public access.

b) To avoid future development in areas with severe soil or other environmental limitations, and to direct development to lakeshore areas with moderate or slight limitations for future recreational or residential development.

c) To ensure that new development does not cause further deterioration in lake water quality.

d) To minimize the cost of servicing existing and future development.

e) To ensure that future development is carried out in harmony with the existing land use pattern, and cultural and historical resources.

f) To conserve valuable farmland.

The above goals and objectives are aimed at maintaining, protecting and improving the quality of Lac La Nonne and its shoreland for the benefit of future generations. They are the underlying principles followed in developing plan alternatives.

B. Development Capacity

The plan alternatives and the eventual final area structure plan for Lac La Nonne must not only reflect and accommodate the established goals and objectives, but also the realities of the various development limitations and constraints within the planning area. One method of identifying the area's constraints and limitations is to determine its development capacity.

There are limits to the amount of growth certain areas can withstand. At Lac La Nonne, how many people and houses can be allowed before the natural environment is endangered and public health and the social environment is placed in jeopardy?

Development capacity refers to the extent an area can withstand change or disruption without causing unacceptable impairment to the natural or social environments. It involves an assessment of as many environmental and social factors as possible to determine the potential for future land use change.

The biophysical and socio-economic information contained in the management study provides direction toward the establishment of development capacity for the lake and shoreland. The conclusions of this information are contained in Section IV of the management study. The conclusions, presented in written, map and table format, provide a summarized assessment of all information sources in the management study. Each conclusion provides direction toward establishing an overall development capacity that is based upon one source of information. Obviously, these separate conclusions will not be consistent since they reflect different information sources.

In order to establish an acceptable development capacity from the various sources of information, three basic methods of interpretation will be used. These methods involve combining this information by producing a summarized biophysical map, developing a summarized table of biophysical and socio-economic conclusions, and interpreting the mapped biophysical information and the summarized table, to verbally express development capacity. These methods are described in more detail as follows.

1. Mapping

Using the overlay or sieve mapping technique, a composite map of land use potential has been produced (see Map 15). This map combines biophysical and land use information. Three maps from the management study have been combined, they are: Map 9 Residential Development Potential; Map 12 CLI Soil Capability for Agriculture and Farmland Assessment; and, Map 13 Existing Land Use. A complex pattern of irregular shaped areas is produced by combining these three maps. In order to present a map that is readily understandable, this combined information has been generalized to the quarter section level of detail.

Generalizing information to the quarter section level of resolution was undertaken by the following method.

a) Agricultural Areas
One or more of the following criteria have been used to designate agricultural areas:
- a portion of a quarter section (usually more than 50%) has a farmland assessment rating of 28% or greater;
- a portion of a quarter section (usually more than 50%) has a CLI soil capability rating of Class 3 or higher; and,
- a portion of a quarter section (usually more than 50%) is cleared and actively used for agricultural activity.

This information was obtained from Map 12 in the management study.

b) Natural Land Areas (low development potential)
Map 12 in the management study entitled: Residential Development Potential, outlines areas that have very severe restrictions on residential development. If more than 50% of a quarter section had very severe residential development limitations, and the remaining 50% did not have agricultural capability or high residential development capability, the quarter section was designated as a Natural Land Area.

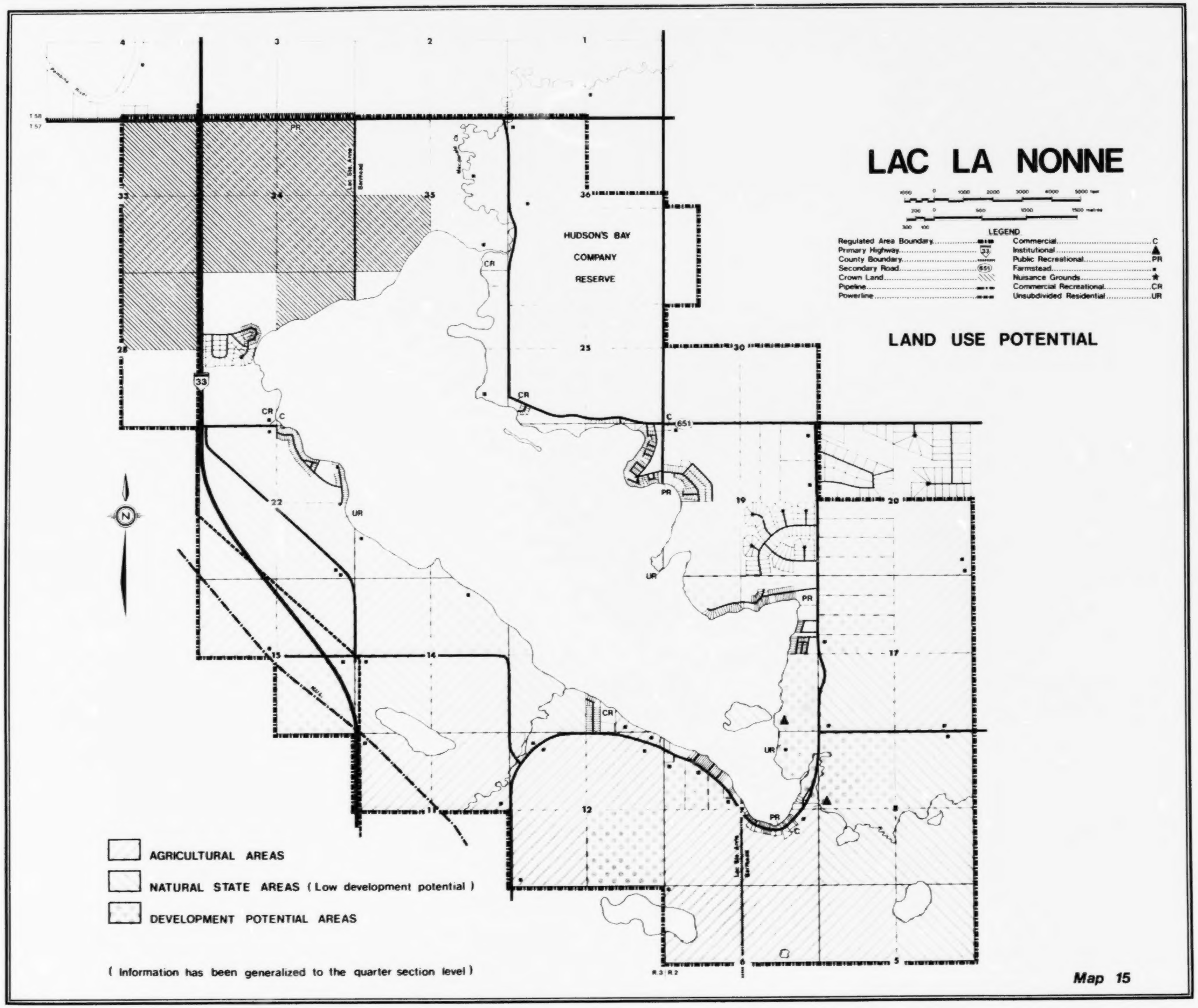
c) Development Potential Areas
Map 12 in the management study also outlines areas that have moderate to slight limitations on future residential development. If a portion of a quarter section (usually more than 50%) had moderate to slight development limitations, the area was designated as having development potential.

d) Existing development shown on Map 15 is taken directly from the existing land use map in the management study - Map 13.

Map 15, outlining areas of land use potential, provides direction toward establishing a development capacity for Lac La Nonne and its shoreland. However, Map 15 is the initial step in the process of establishing development capacity. It does not account for the biophysical and socio-economic factors that cannot be expressed in map format. The discussion that follows describes the biophysical and socio-economic factors that must be incorporated into the planning process before the development capacity of Lac La Nonne and its shoreland can be determined.

2. Summary Table

There are many other factors influencing development capacity at Lac La Nonne in addition to the mapped biophysical information shown on Map 15. The conclusions of the management study provide separate assessments of development limitations that are related to the information that has been analyzed and interpreted. In order to evaluate and assess these individual assessments, they have been combined on one table (see Table 21).

LAC LA NONNE
LEGEND
Regulated Area Boundary
Primary Highway 33
County Boundary
Secondary Road 651
Crown Land
Pipeline
Powerline
Commercial C
Institutional ▲
Public Recreational PR
Farmstead ■
Nuisance Grounds ★
Commercial Recreational CR
Unsubdivided Residential UR
LAND USE POTENTIAL
HUDSON'S BAY COMPANY RESERVE
AGRICULTURAL AREAS
NATURAL STATE AREAS (Low development potential)
DEVELOPMENT POTENTIAL AREAS
(Information has been generalized to the quarter section level)
T 58
T 57
R 3 | R 2
Lac Ste Anne Barrhead
651
33
PR
CR
UR
C

Map 15

Table 21 generalizes the specific conclusions of the management study. Every conclusion shown on the table provides a separate evaluation of the limitations on future development. For example, the first conclusion listed on Table 21 relates to lake water quality information. According to this information, the lake is very eutrophic and any further development must be carefully planned to minimize the addition of nutrients to the lake (see management study conclusions). Therefore, from the perspective of existing lake water quality, the limitations on future development are very high if it is assumed that any future agricultural, recreational or residential development will contribute to lake eutrophication. Each conclusion of the management study that directly affected development capacity was evaluated in this manner. The end result is Table 21 which outlines on a four point scale, the limitations on future development at Lac La Nonne. In order to fully understand Table 21, cross reference should be made to the conclusions in Section IV of the management study.

TABLE 21 SUMMARY OF LAC LA NONNE DEVELOPMENT LIMITATIONS

MANAGEMENT STUDY CONCLUSIONS	LIMITATIONS ON FUTURE DEVELOPMENT			
Biophysical Conclusions	NO	LOW	MEDIUM	HIGH
1. Lake Water Quality			—	—
2. Groundwater		—	—	
3. Vegetation and Wildlife		—	—	
Socio-Economic Conclusions				
1. Public Perceptions				
a) Activities		—	—	
b) Problems			—	—
2. Land Use Analysis				
a) Existing Subdivisions and Development			—	—
b) Crown Lands		—	—	
c) Transportation, Utilities, Other Services, and Municipal Finances	—	—		
3. Recreation Demand and Future Development				
a) Boating Activity			—	—

3. Interpretation of Limiting Factors and Development Capacity

The foregoing discussions of development capacity indicate the potential for growth and change at Lac La Nonne. Because development capacity varies according to the type of information being analyzed and interpreted, it is difficult to establish a single capacity for the lake and shoreland. At best, development capacity should be expressed as a range of growth and change potential.

In order to express development capacity as a range, Map 15 and Table 21 have to be compared and additional factors, that affect development capacity but are not easily expressed in table and map format, considered. Map 15 depicts the areas of highest change potential - a total of 25 partial and whole quarter sections. Table 21, on the other hand, provides a less specific assessment of development limitations in the form of a four point rating - ranging from none to high.

The establishment of a range of development capacity involves a subjective evaluation of the available information. One method of expressing this range is to formulate alternative final plans. At Lac La Nonne five plan alternatives have been formulated. Map 15, which outlines the areas with the best development potential, will be used as a base map in establishing development capacity and presenting the plan alternatives. None of the plan alternatives, however, show all of the 25 development potential quarter sections as having land use change potential. Elimination of some, or in one case all, of the development potential quarter sections was undertaken to reflect additional factors, such as the limitations expressed in Table 21. In this table, water quality, existing subdivisions, and boating activity all reveal moderate to high limitations on future land use change. As a result, one plan alternative recommends that no future development be permitted - an indication of limitations on development. Another alternative recommends that only one or two quarter sections be considered for future land use change - an expression of low development potential. However, the plan alternatives and the eventual final plan must reflect those additional sources of information that are not summarized in Table 21 or Map 15 but are listed in the last section of the Management Study (see Section C that follows). The development capacity of Lac La Nonne, therefore, has been expressed as a range of capacity which is presented in the format of five plan alternatives.

The establishment of a range of development capacity and the formulation of plan alternatives that express this range of development capacity ultimately lead to future change being described in absolute terms such as the number of acres that have development potential or the number of lots that should be subdivided. In many respects, this assigning of numbers is misleading. It is an over-simplification of the detailed analysis and interpretations that were undertaken to determine development capacity. However, expressing the area's development capacity or growth potential in terms of the numbers of development potential acres or the number of lots that should be subdivided in the future can be useful. It provides a clear and concise guideline when future applications are evaluated for their impact upon the increased use of the lake and shoreland. As a result, a numerical expression of Lac La Nonne's development capacity has been developed in Table 22. This table attempts to summarize Lac La Nonne's range of development capacity by presenting alternative final plans. Detailed explanations of the contents of the plan alternatives are described in the plan alternatives document.

PLAN ALTERNATIVES	GOALS AND OBJECTIVES EMPHASIZED BY THE PLAN ALTERNATIVES										DEVELOPMENT CAPACITY OF THE PLAN ALTERNATIVES				NUMERICAL EXPRESSION OF THE PLAN ALTERNATIVES *		
	Goals					Objectives											
	Role of Lake	Maintain Quality of Natural Environment	Maintain Quality of Social Environment	Identify Development Capacity	Municipal Guidance	More Public Recreation Areas	Identify Limitations and Opportunities	Maintain Water Quality	Minimize Servicing Costs	Minimize Impact on Existing Land Use	No	Low	Medium	High	Approximate number of acres that may be considered for future development	Approximate growth potential expressed in commercial recreation sites	Approximate growth potential expressed in subdivided lots
ALTERNATIVE 1	○	●	●	●	○	○	○	●	●	●	◆				0	0	0
ALTERNATIVE 2	◑	◑	◑	●	◑	◑	◑	◑	●	●		◆			180	144	36
ALTERNATIVE 3	●	◑	◑	●	●	●	●	◑	●	●		◆			330	290	36
ALTERNATIVE 4	○	◑	○	●	●	○	●	○	◑	◑			◆		800	0	180
ALTERNATIVE 5	●	○	○	●	●	●	●	○	◑	◑			◆		930	400	108

TABLE 22: LAC LA NONNE'S DEVELOPMENT CAPACITY
AS EXPRESSED BY THE PLAN ALTERNATIVES

○ Low Emphasis
◑ Medium Emphasis
● High Emphasis

---

* As discussed in Section V of the Management Study, this numerical expression is perhaps an over simplification of the detailed analysis and interpretations of the information used to formulate the plan alternatives. Please refer to the discussion portions of each plan alternative to obtain more insight regarding their formulation and subsequent numerical expression of growth potential.

C. Important Issues and Other Factors that Influence the Formulation of a Plan

As outlined in the foregoing discussions, there are many additional factors that influence the formulation of a final plan but cannot be easily evaluated through summary maps or tables.

These additional factors are:

a) the historical use and development of land;
b) the long term (5-10 year) plans of present landowners;
c) the management proposals that may form part of a final plan and the response of present landowners and lake users to these management proposals;
d) the trends in recreation and the demands these trends may have on future development; and
e) the projected growth in population to approximately 1.1 million in the E.R.P.C. planning region by the year 2001.

These factors are discussed in the main text of the management study, Section III, and in the conclusions contained in Section IV. Cross reference to these sections of the management study should be made to obtain a complete understanding of their significance. These additional factors have also assisted in establishing development capacity and presenting the plan alternatives for Lac La Nonne.

Finally, the ultimate success of a lake management plan for Lac La Nonne depends, to a large extent, upon the local municipalities. They are responsible for the adoption and implementation of a final plan. The municipal councils may agree to change goals and objectives which may affect the underlying philosophy, or they may interpret the background information in a manner that results in an alteration to the plan's original intent. Whatever changes occur, the local municipal councils have the authority and mandate to accept or reject a lake management plan. The ultimate success of a final plan is dependent upon their decisions.

In summary, there are many factors that have to be considered when a lake management plan is being prepared. A successful plan attempts to incorporate and assess as many sources of information as possible.

APPENDIX A

Lac La Nonne Questionnaires

1. Landowner Questionnaire
2. Trailer Owner Questionnaire
3. Lake User Questionnaire

- the written numbers represent the total number of responses to the question.

FOR OFFICE USE ONLY

LAC LA NONNE LANDOWNERS QUESTIONNAIRE

[0|1]

Land Ownership

1. In what area of the attached map is your property located? Check one of the subdivisions below, or if you are located outside a subdivision, mark an 'x' on the map to indicate your land. 1 [ ]

a) Horseman 35	h) Moonlight Bay Estates 19
b) Chrystyna 14	i) Idle Hours 19
c) Mortensen 12	j) Greendale 41
d) Williams 18	k) Redwood 0
e) Winkleman 20	l) White Rock 6
f) Lac La Nonne 29	m) Murray Beach 6
g) Moonlight Bay 46	Rural Landowners 31
	Multiple lot owners 3

2. If you are in a subdivided area, how many lots do you own? Check one. 2 [ ]

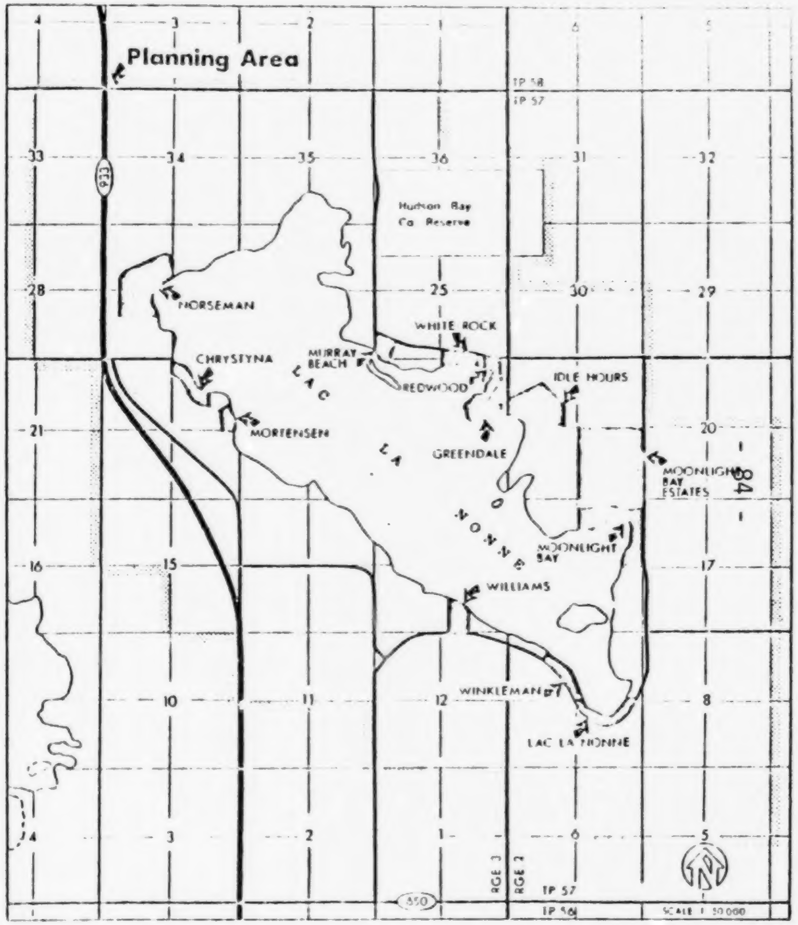
a) One 206	c) Three 8
b) Two 42	d) Four or more 7

3. What is the total size of your property? Check one. 3 [ ]

a) 20,000 sq. feet or less 177	e) 11 - 20 acres 0
b) 20,000 sq. ft. - 1 acre 44	f) 21 - 80 acres 13
c) 1 - 3 acres 38	g) more than 80 acres 11
d) 4 - 10 acres 7	

4. What is the primary present use of your property? Check one only. 4 [ ]

a) Agriculture/permanent residence	9
b) Agriculture/without permanent residence	3
c) Non-agricultural/permanent residence	27
d) Cottage/summer use	114
e) Cottage/year-round use	80
f) Commercial	5
g) Institutional	0
h) Vacant - no use made	22
i) Vacant - recreational use	35


Planning Area
TP 58
TP 57
Hudson Bay Co. Reserve
NORSEMAN
CHRYSTYNA
MURRAY BEACH
WHITE ROCK
REDWOOD
IDLE HOURS
MORTENSEN
LAC
LA
NONNE
GREENDALE
MOONLIGHT BAY ESTATES
MOONLIGHT BAY
WILLIAMS
WINKLEMAN
LAC LA NONNE
33
34
35
36
31
32
28
25
30
29
21
20
16
15
17
10
11
12
8
4
3
2
1
6
5
633
650
RGE 3
RGE 2
TP 57
TP 56
SCALE 1:50 000

5. Do you have livestock on your property?

a) Yes 10
b) No 289

If yes, please indicate the approximate number of each type. Do they have access to the lake or any of its tributaries?

	Number	ACCESS Yes	ACCESS No
a) cattle	578	2	5
b) pigs	41	0	2
c) horses	23	0	2
d) poultry	675	0	4
e) sheep	0	0	1

6. Do you grow any cash or forage crops?

a) Yes 9
b) No 290

If yes, please indicate the number of acres of each of the following types that you normally grow? Do you fertilize these crops?

	Acres	Fertilize Yes	Fertilize No
a) cash/cereal crops	50	1	1
b) cash/vegetable crops	0	0	0
c) forage crops	757	2	5
d) uncultivated pasture	905	1	2

7. What are your long-term (5-10 years) plans for your land? Check one or more.

a) Continue present use	171	f) Build permanent home	13
b) Winterize present cottage for year-round use	28	g) Establish commercial business	4
c) Convert present cottage to permanent home	20	h) Establish institutional use	0
d) Build cottage for summer use	14	i) Apply for subdivision	10
e) Build cottage for year-round use	32	j) Sell one or more lots within a subdivided area	11
		k) Undecided	26

8. How do you usually gain access to the lake? Check one.

a) Have direct access from property	145
b) Through major public beach	25
c) Through subdivision public reserve	44
d) Through undeveloped provincial land	6
e) Through neighbour's property	12
f) By road allowance	49
g) Don't make use of the lake	13

9. How many members of your household are within the following age categories?

a) Children (under 13)	183	c) Non-retired adults	656
b) Teenagers (13-17)	149	d) Retired adults	107

10. How much time do you spend here each year? To the best of your recollection, please indicate on the calendar provided, the NUMBER of people (yourself, family, friends, etc.) that used your cottage, home or property on any given day during 1979. Long weekends are shaded in.

|1|4|

Services

11. What services do you use for your property? Check one or more.

a) Electricity	197	e) Garbage collection	2
b) Propane	115	f) School busing	16
c) Natural gas	65	g) Septic tank pump-out	33
d) Telephone	66		

1979

January 0 2 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February 0 3 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

March 0 4 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

April 0 5 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

May 0 6 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

June 0 7 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

July 0 8 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

August 0 9 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September 1 0 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

October 1 1 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

November 1 2 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

December 1 3 (5 6)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

TOTAL EXISTING USER DAYS

12. What is your principle source of drinking water? Check one. 12

a) Lake	0	d) Neighbour's well	19
b) Spring	1	e) Community well	26
c) Private well at property	69	f) Brought from home	169

13. What type of toilet waste disposal system(s) do you use. Check one or more. 13

a) Pit toilet	200	c) Septic holding tank (pump-out)	34
b) Septic tank system (field)	32	d) Chemical toilet	40

14. Have you encountered any of the following problems with your toilet waste disposal system? Check one or more. 14

	Yes	No	Don't know
a) Septic system back-up into home	2	123	5
b) Odour	29	132	6
c) Septic field problems	1	116	5
d) Pit toilet flooded by groundwater	37	158	9

15. What type of sink waste disposal system(s) do you use? Check one or more. 15

a) Dry well	33	d) Poured on the ground	97
b) Septic tank	65	e) Poured into the lake	0
c) Pit toilet	73		

16. Do you encounter any of the following problems with traffic on your local access roads? Check one or more. 16

a) Dust	152	e) Heavy traffic	32
b) Potholes	135	f) Safety hazards	42
c) Noise	86	g) Lack of sidewalks	19
d) Lack of speed bumps	35	h) No problems	77

Site Conditions

17. Have you encountered any of the following problems with your property?

	Yes	No	Don't know
a) Unstable building site	7	159	21
b) Poor soil conditions	34	141	22
c) Occasional flooding by lake	30	155	13
d) Drainage problems	31	153	14
e) Inadequate drinking water supply	52	110	31
f) Inadequate drinking water quality	45	100	36
g) Ice or wave erosion of shoreline	70	122	17

18. In regard to water quality or aesthetic condition of the lake for recreational use, do you consider the following a problem?

	Yes	No	Don't Know
a) Algae growth	245	10	11
b) Weed growth	245	14	10
c) Rocky beach	41	104	12
d) Small beach	70	85	14
e) Soft lake bottom	106	57	21
f) Dirty or polluted water	125	47	23
g) Swimmers itch	136	46	29
h) Odour	146	48	10

19. Regarding lake levels, which are of most concern to you? Check one or more.

a) Flooding risk to buildings	11	d) Lake level too low for boating	35
b) Flooding risk to land	19	e) Changing water levels	63
c) Erosion of land	49	f) No concerns	152

20. How important is protection of the area's wildlife to you?

a) Very important	220
b) Important	66
c) Not important	9

1 5

Recreational Activities

21. From the following list, please rank the summer recreational activities that you engage in. (i.e. 1 for most important, 2 for second most important, and so on.)

a) Swimming	185	h) Waterskiing	104
b) Fishing	258	i) General sightseeing and relaxation	230
c) Camping	87	j) Picnicking	104
d) Sailing	36	k) Nature study/ photography	112
e) Power boating	123	l) Golfing	41
f) Canoeing	91		
g) Hunting	31		

22. From the following list, please rank the winter recreational activities that you engage in. (i.e. 1 for most important, 2 for second most important and so on.)

a) Snowmobiling	176	f) Ice boating	17
b) Hunting	35	g) Skating	98
c) Cross-country skiing	126	h) General sightseeing and relaxation	176
d) Snowshoeing	43		
e) Ice fishing	190		

23. How many boats of each type do you use on the lake? Indicate the number (1, 2, 3, etc.)

a) Motorboats: under 20 H.P.	187
b) Motorboats: 20 - 80 H.P.	126
c) Motorboats: over 80 H.P.	36
d) Row boat	136
e) Canoe or kayak	97
f) Sailboat	26

24. Where do you launch your boat(s)? Check one or more.

a) Private dock	114	d) Offshore boat lift or boathouse	30
b) Public dock	77		
c) From property without dock	63		

25. Please rate the use of the lake surface (boats, skiers, etc.) and public beach areas using the table provided below. Use the following definitions as a guide:

Under used - room for more boats, skiers, etc.
Adequately used - just enough boats, skiers, etc.
Over used - too many boats, skiers, etc.

Check the response that best describes your opinion.

	Under Used	Adequately Used	Over Used	Don't Know
During the week:				
Lake surface	100	115	4	59
Public beach areas	76	75	13	92
On a regular weekend:				
Lake surface	16	154	77	30
Public beach areas	15	102	67	78
On a long weekend:				
Lake surface	14	106	132	31
Public beach areas	15	58	113	77

Personal Perceptions

26. Have you encountered any of the following problems on or adjacent to your property?

	Yes	No	Don't Know
a) Vandalism	99	154	14
b) Conflicts with other cottagers over beach use	20	213	13
c) Conflicts with the general public over beach use	25	204	16
d) Disturbances, because other residents are too close	41	194	10
e) Trespassing	96	154	17

27. Which of the following do you feel are necessary for management of the study area? Of those you consider necessary, would you support them financially (user fees, tax increase, private investment, etc.)? Check yes or no.

	Necessary		Financial Support	
	Yes	No	Yes	No
Lake and Land Use Controls:				
a) Water surface zoning	85	93	39	72
b) Land use zoning	137	56	56	70
c) Boat speed restrictions	167	61	60	75
d) Firearm discharge control	185	45	66	64
e) Stronger by-law enforcement	126	61	64	61
f) Water level regulation	103	75	52	65
g) Weed control	224	22	137	38
h) Water quality improvement	182	25	109	41
i) Protection of wildlife habitat	207	25	98	58
Services Improvements:				
j) Garbage disposal	88	94	45	65
k) Sewage treatment	61	108	36	69
l) Waste water disposal	65	104	36	68
m) Police protection	133	75	77	57
n) School busing	25	128	17	78
Capital Improvements:				
o) Roads	145	70	82	52
p) Road lighting	45	129	29	72
q) Pedestrian walkways	23	142	13	85
r) Public docks	91	99	44	73
s) Public beaches clean-up	129	70	58	64
t) Public campgrounds & picnic areas	65	109	22	81
u) Hiking and skiing trails	99	83	79	62
v) Marking of navigational hazards	86	85	47	65

28. What were your reasons for selecting land in this particular area (eg. lake beauty, accessibility, investment potential, etc.)? Please note any factors that influenced your decision.

28 51 53

60 62

29. We appreciate the time you have taken to answer this questionnaire. Please use the remaining portion for any additional comments or suggestions you may want to make. Include any specific problems you have encountered that were not covered in the questionnaire.

29 63 65

72 74

MODIFIED

LAC LA NONNE LANDOWNERS QUESTIONNAIRE

FOR TRAILER OWNERS

FOR OFFICE USE ONLY

1 4

0 1
5 6

Land Ownership

1. In what area of the attached map is your property located? Check one of the subdivisions below, or if you are located outside a subdivision, mark an 'x' on the map to indicate your land. 1

7 8

a) Norseman
b) Chrystyna
c) Mortensen
d) Williams
e) Winkleman
f) Lac La Nonne
g) Moonlight Bay
h) Moonlight Bay Estates
i) Idle Hours
j) Greendale
k) Redwood
l) White Rock
m) Murray Beach

2. If you are in a subdivided area, how many lots do you own? Check one. 2

9

a) One
b) Two
c) Three
d) Four or more

3. What is the total size of your property? Check one. 3

10

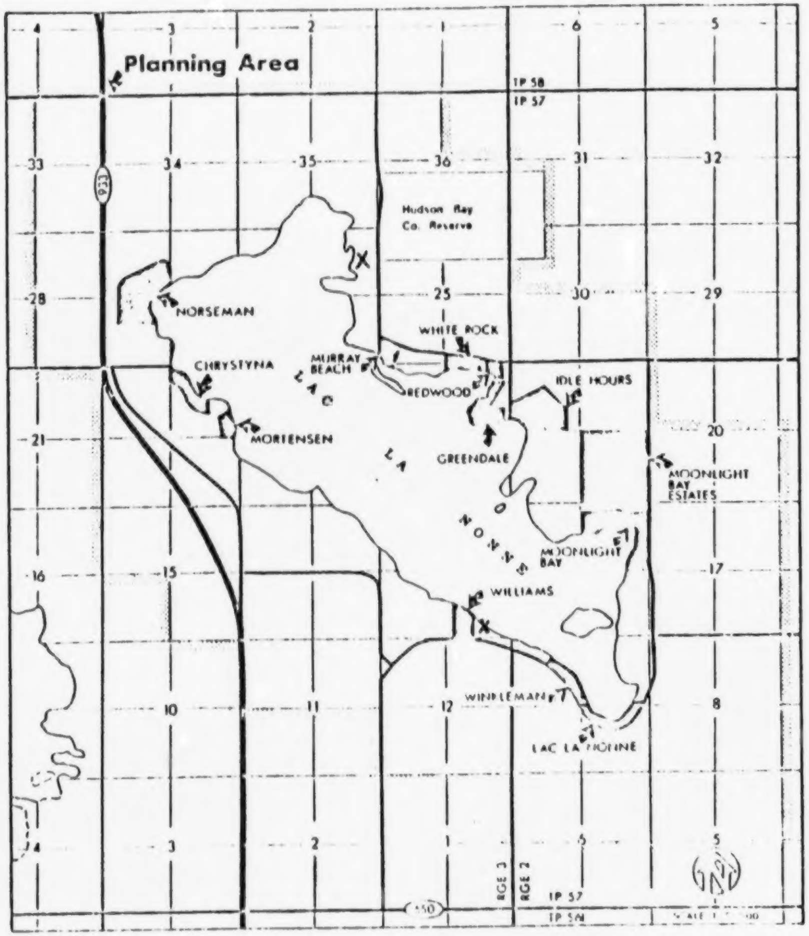
a) 20,000 sq. feet or less
b) 20,000 sq. ft. - 1 acre
c) 1 - 3 acres
d) 4 - 10 acres
e) 11 - 20 acres
f) 21 - 80 acres
g) more than 80 acres

4. What is the primary present use of your property? Check one only. 4

11

a) Agriculture/permanent residence
b) Agriculture/without permanent residence
c) Non-agricultural/permanent residence
d) Cottage/summer use
e) Cottage/year-round use
f) Commercial
g) Institutional
h) Vacant - no use made
i) Vacant - recreational use

N/A


Planning Area
Hudson Bay Co. Reserve
NORSEMAN
CHRYSTYNA
MURRAY BEACH
WHITE ROCK
REDWOOD
IDLE HOURS
MORTENSEN
GREENDALE
MOONLIGHT BAY ESTATES
MOONLIGHT BAY
WILLIAMS
WINKLEMAN
LAC LA NONNE
LAC LA NONNE
TP 58
TP 57
RGE 3
RGE 2
633
650

5. Do you have livestock on your property?

a) Yes

b) No

If yes, please indicate the approximate number of each type. Do they have access to the lake or any of its tributaries?

	Number	Access Yes	Access No
a) cattle			
b) pigs			
c) horses			
d) poultry			
e) sheep			

6. Do you grow any cash or forage crops?

a) Yes

b) No

If yes, please indicate the number of acres of each of the following types that you normally grow? Do you fertilize these crops?

	Acres	Fertilize Yes	Fertilize No
a) cash/cereal crops			
b) cash/vegetable crops			
c) forage crops			
d) uncultivated pasture			

5

6

N/A

7. What are your long-term (5-10 years) plans for your land? Check one or more.

- a) Continue present use ____
- b) Winterize present cottage for year-round use ____
- c) Convert present cottage to permanent home ____
- d) Build cottage for summer use ____
- e) Build cottage for year-round use ____
- f) Build permanent home ____
- g) Establish commercial business ____
- h) Establish institutional use ____
- i) Apply for subdivision ____
- j) Sell one or more lots within a subdivided area ____
- k) Undecided ____

N/A

7 a) f) g) k) 50 60

8. How do you usually gain access to the lake? Check one.

- a) Have direct access from property 11
- b) Through major public beach 9
- c) Through subdivision public reserve 1
- d) Through undeveloped provincial land 0
- e) Through neighbour's property 0
- f) By road allowance 6
- g) Don't make use of the lake 0

8 [ ] 61

9. How many members of your household are within the following age categories?

- a) Children (under 13) 25
- b) Teenagers (13-17) 17
- c) Non-retired adults 43
- d) Retired adults 6

9 62 63 [ ][ ] [ ][ ] [ ][ ] [ ][ ] 68 69

10. How much time do you spend here each year? To the best of your recollection, please indicate on the calendar provided, the NUMBER of people (yourself, family, friends, etc.) that used your cottage, home or property on any given day during 1979. Long weekends are shaded in.

[1|4] 5 6

Services

11. What services do you use for your property? Check one or more.

- a) Electricity 0
- b) Propane 20
- c) Natural gas 0
- d) Telephone 10
- e) Garbage collection 17
- f) School busing 0
- g) Septic tank pump-out 13

11 a) d) g) 7 10 11

1979

January [0|2] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February [0|3] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

March [0|4] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

April [0|5] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

May [0|6] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

June [0|7] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

July [0|8] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

August [0|9] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September [1|0] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

October [1|1] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

November [1|2] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

December [1|3] 5 6

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

TOTAL USER DAYS

12. What is your principle source of drinking water? Check one.

a) Lake 1
b) Spring 0
c) Private well at property 8
d) Neighbour's well 1
e) Community well 5
f) Brought from home 14

13. What type of toilet waste disposal system(s) do you use. Check one or more.

a) Pit toilet 7
b) Septic tank system (field) 2
c) Septic holding tank (pump-out) 20
d) Chemical toilet 7

14. Have you encountered any of the following problems with your toilet waste disposal system? Check one or more.

	Yes	No	Don't know
a) Septic system back-up into home	0	13	2
b) Odour	4	13	1
c) Septic field problems	0	13	1
d) Pit toilet flooded by groundwater	3	12	1

15. What type of sink waste disposal system(s) do you use? Check one or more.

a) Dry well 1
b) Septic tank 21
c) Pit toilet 1
d) Poured on the ground 3
e) Poured into the lake 0

16. Do you encounter any of the following problems with traffic on your local access roads? Check one or more.

a) Dust 23
b) Potholes 26
c) Noise 2
d) Lack of speed bumps 0
e) Heavy traffic 4
f) Safety hazards 5
g) Lack of sidewalks 2
h) No problems 4

Site Conditions

17. Have you encountered any of the following problems with your property?

	Yes	No	Don't know
a) Unstable building site	0	13	2
b) Poor soil conditions	0	12	2
c) Occasional flooding by lake	0	11	3
d) Drainage problems	2	10	3
e) Inadequate drinking water supply	4	9	2
f) Inadequate drinking water quality	7	8	2
g) Ice or wave erosion of shoreline	2	10	3

18. In regard to water quality or aesthetic condition of the lake for recreational use, do you consider the following a problem?

	Yes	No	Don't Know
a) Algae growth	30	0	0
b) Weed growth	28	0	0
c) Rocky beach	7	10	0
d) Small beach	14	4	0
e) Soft lake bottom	12	6	0
f) Dirty or polluted water	13	4	2
g) Swimmers itch	14	6	1
h) Odour	12	7	0

19. Regarding lake levels, which are of most concern to you? Check one or more.

a) Flooding risk to buildings 0
b) Flooding risk to land 0
c) Erosion of land 1
d) Lake level too low for boating 9
e) Changing water levels 4
f) No concerns 13

20. How important is protection of the area's wildlife to you?

a) Very important 24
b) Important 7
c) Not important 0

1 5

Recreational Activities

21. From the following list, please rank the summer recreational activities that you engage in. (i.e. 1 for most important, 2 for second most important, and so on.)

a)	Swimming	19	h)	Waterskiing	14
b)	Fishing	29	i)	General sightseeing and relaxation	25
c)	Camping	28	j)	Picnicking	8
d)	Sailing	3	k)	Nature study/ photography	4
e)	Power boating	16	l)	Golfing	3
f)	Canoeing	5			
g)	Hunting	3			

22. From the following list, please rank the winter recreational activities that you engage in. (i.e. 1 for most important, 2 for second most important and so on.)

a)	Snowmobiling	10	f)	Ice boating	2
b)	Hunting	4	g)	Skating	6
c)	Cross-country skiing	6	h)	General sightseeing and relaxation	12
d)	Snowshoeing	1			
e)	Ice fishing	14			

23. How many boats of each type do you use on the lake? Indicate the number (1, 2, 3, etc.)

a)	Motorboats: under 20 H.P.	14
b)	Motorboats: 20 - 80 H.P.	10
c)	Motorboats: over 80 H.P.	5
d)	Row boat	5
e)	Canoe or kayak	1
f)	Sailboat	1

24. Where do you launch your boat(s)? Check one or more.

a)	Private dock	14	d)	Offshore boat lift or boathouse	0
b)	Public dock	11			
c)	From property without dock	2			

25. Please rate the use of the lake surface (boats, skiers, etc.) and public beach areas using the table provided below. Use the following definitions as a guide:

Under used - room for more boats, skiers, etc.
Adequately used - just enough boats, skiers, etc.
Over used - too many boats, skiers, etc.

Check the response that best describes your opinion.

	Under Used	Adequately Used	Over Used	Don't Know
During the week:				
Lake surface	11	12	1	6
Public beach areas	12	9	0	7
On a regular weekend:				
Lake surface	1	20	7	2
Public beach areas	0	20	5	3
On a long weekend:				
Lake surface	0	8	20	2
Public beach areas	0	9	16	3

Personal Perceptions

26. Have you encountered any of the following problems on or adjacent to your property?

	Yes	No	Don't Know
a) Vandalism	2	24	0
b) Conflicts with other cottagers over beach use	1	25	0
c) Conflicts with the general public over beach use	0	26	0
d) Disturbances, because other residents are too close	4	21	1
e) Trespassing	3	22	0

1 6

27. Which of the following do you feel are necessary for management of the study area? Of those you consider necessary, would you support them financially (user fees, tax increase, private investment, etc.)? Check yes or no.

27

	Necessary		Financial Support	
	Yes	No	Yes	No
Lake and Land Use Controls:				
a) Water surface zoning	7	9	3	4
b) Land use zoning	11	2	3	6
c) Boat speed restrictions	13	6	6	3
d) Firearm discharge control	15	4	6	3
e) Stronger by-law enforcement	8	4	5	2
f) Water level regulation	12	2	5	3
g) Weed control	25	0	9	4
h) Water quality improvement	20	1	7	3
i) Protection of wildlife habitat	18	2	7	3
Services Improvements:				
j) Garbage disposal	5	7	5	3
k) Sewage treatment	11	6	6	3
l) Waste water disposal	13	5	6	3
m) Police protection	8	4	4	4
n) School busing	1	8	1	6
Capital Improvements:				
o) Roads	22	2	8	5
p) Road lighting	3	11	1	5
q) Pedestrian walkways	2	11	1	5
r) Public docks	8	5	4	4
s) Public beaches clean-up	16	2	6	3
t) Public campgrounds & picnic areas	7	6	5	3
u) Hiking and skiing trails	6	6	3	3
v) Marking of navigational hazards	15	2	5	4

28. What were your reasons for selecting land in this particular area (eg. lake beauty, accessibility, investment potential, etc.)? Please note any factors that influenced your decision.

28

29. We appreciate the time you have taken to answer this questionnaire. Please use the remaining portion for any additional comments or suggestions you may want to make. Include any specific problems you have encountered that were not covered in the questionnaire.

29

LAKE: *Lac La Nonne*

SURVEYOR: ________ LOCATION: ________ TIME: ________

DATE: ________ WEATHER: ________

[0|1]

LAKE USER QUESTIONNAIRE

1. Are you from Edmonton?
   - (1) Yes 12
   - (2) No 9

2. (If no) how far have you travelled?
   - (1) 10 miles or less 1
   - (2) 11 - 20 miles 4
   - (3) 21 - 60 miles 2
   - (4) more than 60 miles 2

3. What day did you arrive?
   - (1) Monday 1
   - (2) Tuesday 0
   - (3) Wednesday 0
   - (4) Thursday 0
   - (5) Friday 9
   - (6) Saturday 6
   - (7) Sunday 5

4. How long do you plan to stay?
   - (1) For the day 8
   - (2) Overnight 1
   - (3) 2 nights 9
   - (4) 3 nights 2
   - (5) 3 days - 1 week 0
   - (6) more than 1 week 0
   - (7) for the season 1

5. (If staying for the day) for how many hours?
   - (1) less than 2 hours 2
   - (2) 2 - 4 hours 3
   - (3) 5 - 8 hours 3
   - (4) more than 8 hours 0

6. How many times have you been here before for summer recreational activities?
   - (1) 0 4
   - (2) 1 - 5 10
   - (3) 6 - 20 0
   - (4) more than 20 7

7. Do you make use of the lake area for winter recreational activities?
   - (1) Yes 9
   - (2) No 11

8. (If staying overnight or longer) where are you staying?
   - (1) Rented cabin 0
   - (2) Friend's cottage 0
   - (3) Campground 8
   - (4) Hotel/Motel 0
   - (5) Seasonal Trailer Park 3
   - (6) Access Point 2

9. (If camping), what type of camping shelter are you using?
   - (1) Tent 0
   - (2) Van/truck camper 6
   - (3) Travel or tent trailer 3
   - (4) Mobile Home 3

10. What type of group are you with?
    - (1) Alone 0
    - (2) Couple 2
    - (3) Family 14
    - (4) Non family 5
    - (5) Organized Group 0

11. How many people are in your party? (Write in number)

    87

12. How many people of each age category are in your group (write in numbers)?
    - (1) Children (under 13) 17
    - (2) Teenagers (13-17) 8
    - (3) Adults (18 and over) 62

13. What types of problems have you had with local access routes? (Check one or more)
    - (1) Dust 2
    - (2) Potholes 13
    - (3) Noise 0
    - (4) Lack of speed bumps 0
    - (5) Heavy traffic 1
    - (6) Safety hazards 1
    - (7) Lack of sidewalks 0
    - (8) No problems 6

14. Why did you come to this particular lake? (Check one or more)

(1) Natural beauty 2
(2) Good fishing 11
(3) Close to highway 4
(4) Close to home 13
(5) Close to town/village for supplies 1
(6) Friends/relatives nearby 4
(7) Wildlife/waterfowl 1
(8) Boating 6
(9) Campground facilities 5
(10) Recreational reasons (eg. swimming, hiking, etc.) 5

14

15

15. How important is protection of the area's wildlife to you?

(1) Very important 13
(2) Important 7
(3) Not important 1

16

16. What types of recreational activities are you pursuing here? (Rank in order of response.)

(1) Swimming 4
(2) Fishing 18
(3) Camping 12
(4) Sailing 1
(5) Power boating 4
(6) Canoeing 1
(7) Hunting 1
(8) Water skiing 7
(9) General sightseeing and relaxation 8
(10) Picnicking 4
(11) Nature study/photography 0
(12) Golfing 0

17

17. How many boats of each type are you using on this lake? (Read list and write in numbers)

(1) Motor boats: under 20 H.P. 11
(2) Motor boats: 20 - 80 H.P. 3
(3) Motor boats: over 80 H.P. 3
(4) Rowboat 0
(5) Canoe or Kayak 1
(6) Sailboat 0

18. What types of boating problems have you observed at the lake? (Check one or more.)

(1) Speeding boats 6
(2) Congestion of boats 1
(3) Lack of docking facilities 2
(4) Lack of launching facilities 2
(5) Excessive boat noise 0
(6) Discourteous boaters 3
(7) Conflicts between boaters and swimmers 1
(8) Conflicts between power and non power boaters 0
(9) Lack of marked boating hazards 1
(10) No problems 9

19

19. Do you think the facilities here are adequate?

(1) Yes 13
(2) No 8

(If no) what needs improvement? (Check one or more.)
(1) Restaurants & concession stands 4
(2) Service stations 0
(3) Grocery stores 0
(4) Hotels/motels 1
(5) Boat rentals 1
(6) Public washrooms 3
(7) Public change areas 2
(8) Roads 2

20

20. What problems have you noticed with the physical condition of the lake for recreational use? (Check one or more.)

(1) Algae growth 12
(2) Weed growth 15
(3) Fluctuating water levels 3
(4) Poor boating conditions 1
(5) Poor fishing 2
(6) Dirty or polluted water 6
(7) Polluted areas 0
(8) Rocky beach 3
(9) Small beach 2
(10) Soft lake bottom 1
(11) Insects 3
(12) Poor accessibility 1
(13) No problems 2

21. What types of problems have you encountered with other lake users? (Check one or more.)

21 39 41 42 45

(1) Vandalism	0	(5) Conflicts with cottagers	0
(2) Beach crowding	0	(6) Trespassing	0
(3) Crowded camping	1	(7) No problems	16
(4) Conflicts between other recreationalists	0		

22. Do you think any kind of regulations or restrictions are needed in this area?

22 46

(1) Yes 3

(2) No 17

(If Yes), what types are needed? (Check one or more.)

47 50 51 54

(1) Boat speed restrictions	2	(5) Firearms regulations	3
(2) Water surface zoning	2	(6) Stricter By-law enforcement	0
(3) Water level regulation	1	(7) Sewage treatment regulations	0
(4) Land use zoning	1	(8) Wildlife habitat protection	1

23. Would you like to make any additional comments?

23 55 56 59 60

APPENDIX B

LAC LA NONNE

Public Information Exchangee Meetings Report

Edmonton Regional Planning
Commission

October, 1980

TABLE OF CONTENTS

Page

Introduction 1

Attendance 2

Summary of Proceedings and Subsequent Briefs 4

  Water Quality 4
  Fish and Wildlife 5
  Winter and Summer Recreation 6
  Roads, Waste Disposal Grounds, Sewage Disposal, Water Supply and Police and Fire Protection 7
  Municipal Representation, Taxation and Future Recreational and Residential Development 8
  Other Concerns and Recommendations 10

Conclusion 11

Appendix A Excerpts from Representative Briefs 11

Lac La Nonne

Public Information Exchange Meetings Report

October, 1980

Introduction

The Lac La Nonne Public Information Exchange Meetings were held as follows:

DATE	TIME	LOCATION
Tuesday, September 30, 1980	7:30 P.M.	Parkview Community Center 9135 - 146 Street Edmonton, Alberta
Saturday, October 4, 1980	10:30 A.M.	Rich Valley Community Hall Rich Valley, Alberta

The format of these meetings was as follows:

- Registration, and informal discussion and review of display panels
- Introduction of Municipal Councillors and Planners
- Slide presentation on water quality
- Discussion of the slide presentation
- Discussion of the report and management issues affecting Lac La Nonne
- Coffee and informal discussion

Two weeks before these meetings were held, all 564 landowners in the Lac La Nonne Planning area received the initial report entitled: Lac La Nonne Background Information and Management Issues. This report contained: biophysical and land use information; a list of management issues and their planning significance; and, a list of the meeting dates, times and locations. Copies of this report were also made available at each public meeting. In addition, the news media released information regarding the lake management plan and the announcement of the public meetings.

Attendance

Municipal Councillors and Representatives

Tuesday, September 30, 1980	Mr. J. Smith, County of Barrhead, Reeve (Chairman of public meeting) Mr. I. Wimmer, County of Barrhead, Councillor Mr. A. Charles, County of Barrhead, County Manager Mr. L. Percy, County of Lac Ste. Anne, Development Officer
Saturday, October 4, 1980	Mr. A. Barr, County of Lac Ste. Anne, Reeve (Chairman of public meeting) Mr. R. Lehman, County of Lac Ste. Anne, Councillor Mr. A. Golinski, County of Lac Ste. Anne, Councillor Mr. L. Percy, County of Lac Ste. Anne, Development Officer Mr. I Wimmer, County of Barrhead, Councillor Mr. A. Charles, County of Barrhead, County Manager

Planners and Provincial Government Representatives

Tuesday, September 30, 1980	Wes Shennan, Edmonton Regional Planning Commission (E.R.P.C.) Project Planner Cathy Schreiner, E.R.P.C., Planner Pat Cary, E.R.P.C., Planner Dave Barber, Alberta Municipal Affairs, Planner Hal Hamilton, Alberta Environment Pat Mitchell, Alberta Environment
Saturday, October 4, 1980	Wes Shennan, E.R.P.C., Project Planner Cathy Schreiner, E.R.P.C., Planner Pat Cary, E.R.P.C., Planner Tom Hong, Alberta Municipal Affairs, Senior Planner Hal Hamilton, Alberta Environment Fred Schulte, Alberta Environment Ken Zelt, Fish and Wildlife Division of Alberta Energy and Natural Resources

Public

	Registrations	Estimated Attendance
Tuesday, September 30, 1980	120	130
Saturday, October 4, 1980	85	100

The registration list indicated, that from the 130 participants at Tuesday's meeting, a total of 18 of these same people attended Saturday's meeting. At Saturday's meeting, the members of the public were asked to identify themselves as:

- landowners within the rural community (farmers);
- permanent residents who are not farmers (usually people living in permanent homes that have been constructed in areas originally designed for seasonal resort cottages);
- seasonal landowners (mainly cottage owners); and
- lake users who do not own land in the planning area (day users or overnight campers).

By asking for a show of hands, the 100 people attending Saturday's meeting were identified as representatives of the following land use categories:

Rural landowners (farmers)	9
Permanent Residents (non-farmers)	23
Seasonal landowners by area of subdivision (mainly cottage owners)	
Birch Cove	4
Chrystyna	2
Mortensen	4
Williams	2
Winkleman	9
Lac La Nonne	9
Moonlight Bay	11
Moonlight Bay Estates	5
Greendale	12
Idle Hours	4
White Rock	0
Redwood	0
Sunset Cove	6
Non-landowners (day users and overnight campers)	0
TOTAL	100

Summary of Proceedings and Subsequent Briefs

The two public meetings and the twelve subsequent briefs, have been very beneficial to the planning team. These discussions and briefs focused upon the known management issues that were outlined in the report and display panels, and also brought attention to additional management issues that were not identified prior to the public meetings. In addition to discussing known issues and identifying new areas of concern, the public also provided more direction to the planning team in the form of recommendations that should be seriously considered in the planning process.

The following list of management issues and their recommendations (generated from the public meetings) has been organized in accordance with subject areas. It should be noted that these issues and recommendations are not necessarily those of the local municipalities or the planning authorities. These issues and recommendations have been identified to assist in the planning process, and will be combined with the list of issues that were identified prior to the public meetings. From this complete listing of issues and recommendations, it is anticipated that sufficient direction will have been provided toward the development of Plan Alternatives for Lac La Nonne.

The management issues generated from the public meetings are listed in accordance with the subject areas that follow.

Water Quality

The slide show presented by Alberta Environment on water quality, generated many management issue questions, and resulted in the identification of recommendations for future planning. The questions that were asked focused upon: the main contribution of nutrients to the lake; existing legislation regarding weed removal in the lake and vegetation removal along the shoreline; location of pit privies in relation to lake and water table; the use of fertilizers and location of cattle in the watershed; the cause of algae; and, mercury pollution of the lake and fish populations.

Water Quality Recommendations received from the public:

1. Develop a weed cutting program at Lac La Nonne. This program should include a map indicating sensitive areas where weeds should not be cut and guidelines regarding the time of year and the best method of cutting weeds.
2. Recommend that the County of Barrhead purchase a weed cutter.
3. Ensure that an ongoing assessment of the lake water quality will be maintained. The Provincial Government should be approached to provide the necessary funds and expertise to continue lake water quality monitoring at Lac La Nonne.

4. Recommend that the powers of the Provincial Government be extended to assist in the improvement of lake water quality, if the lake becomes dangerously eutrophic.
5. Ensure that more funds are made available from the Provincial Government to make an in-depth assessment of watershed hot spots (areas contributing excessive nutrients to the lake).
6. Recommend that road widths in newly subdivided areas be reduced to decrease the amount of run-off into the lake.
7. Allow more subdivision in agricultural areas to reduce agricultural run-off into the lake.
8. Recommend that all new agricultural activities within one kilometer of the lake, and along inflowing streams, be restricted to: crops with no fertilizers; market gardens; and, minimal pasturing of animals. Future intensive livestock operations or extensions to existing operations should be prohibited within this zone.

Fish and Wildlife

Many questions were asked in relation to the fish and wildlife of the lake and its surrounding shoreland. These areas of concern were in relation to: commercial fishing at Lac La Nonne; government extraction of fish to stock lakes in the surrounding area; mercury pollution of the fish; fish being trapped and dying in Majeau Creek due to beaver dams; depleted Walleye populations (pickerel); poor fishing compared to how it used to be 10 years ago; weed removal depleting fish populations; control of Ling Cod populations; excessive fishing winter and summer; restocking the lake with fish; contamination of the fish through water pollution; development of a wildlife preserve on the Crown land; and, restriction of all types of hunting around Lac La Nonne.

Fish and Wildlife Recommendations received from the public:

9. Recommend to the Provincial Government that commercial fishing should not be allowed in the future.
10. Recommend that commercial fishing be allowed to remove the poorer fish and thereby improve sport fishing.
11. Recommend that a plebicite be held if commercial fishing is considered in the future.

12. Recommend to the Provincial Government that beaver dams be removed from Majeau Creek to allow the free migration of fish populations.

13. Recommend that the possibility of instituting a fish stocking program at Lac La Nonne be investigated.

14. Insure that stricter enforcement of wildlife regulations be undertaken to control overfishing and indiscriminate use of fire arms.

15. Prohibit hunting immediately adjacent to Lac La Nonne.

16. Recommend that the Provincial Government establish a wildlife preserve on the Crownland located along the northwestern portion of the planning area. This would prohibit hunting, camping, and vehicular access to the lake. The existing cross country ski trail would not be in conflict with the preserve.

Winter and Summer Recreation

The concerns and issues relating to winter and summer recreation at Lac La Nonne concentrated upon: excessive noise and trespassing caused by discourteous operation of snowmobiles, trailbikes, and motorboats; vandalism, especially during the week; lack of adequate police protection; lack of recreational vehicle parks; a need for more general public access areas; reluctance of the provincial government to develop a public area on the Crownland they presently own; general lack of community facilities such as a good community hall; a need for more boat launching facilities and parking stalls for cars and boat trailers; more signs needed that indicate public use areas; and, lack of picnic areas for the general public.

Winter and Summer Recreation Recommendations received from the public:

17. Approach the Provincial Government to develop a recreational vehicle park on the existing Provincial Crownland.

18. Approach the Provincial Government to develop boat launching, picnicking, hiking trail, and beach use facilities on the existing Provincial Crownland. This could be a Provincial Park.

19. Develop more public access points along the shoreline of Lac La Nonne and indicate the location of these areas by adequate signs.

20. Prohibit further recreational development until all management issues related to lake ecology and present recreational use have been addressed.

21. Provide incentives (from the Provincial Government) for development of existing public reserves.

22. Approach the County of Lac Ste. Anne for assistance to build a Community Hall at Lac La Nonne.

23. Address the problem of discourteous and noisy boaters using Lac La Nonne. The establishment of boat speed limits could be investigated.

24. Recommend that restrictions on the use of trailbikes and snowmobiles be implemented in the Lac La Nonne area.

25. Set rigid design and control standards on future recreation parks developed by private individuals.

Roads, Waste Disposal Grounds, Sewage Disposal, Water Supply and Police and Fire Protection

Management issue questions focused upon the following areas of concern: improvement in road maintenance (although some people indicated that existing road maintenance is acceptable); improvement of road access to the lake especially for the general public; improvement to the local road maintenance and the method of solid waste disposal at the waste disposal grounds; ensuring that septic pump out systems are pumped out and hauled to designated disposal areas; requesting water quality and quantity information before areas are subdivided as existing areas have poor or non-existant water supplies; and, increasing police patrols and fire protection.

Roads, Waste Disposal Grounds, Sewage Disposal, Water Supply and Police and Fire Protection Recommendations received from the public:

26. Approach the County of Barrhead to upgrade the level of road maintenance that currently exists on the access road to the local waste disposal site.

27. Improve the access road from Highway 33 to the Lac La Nonne Store. Improvement of this roadway should be a joint Provincial and Municipal responsibility as the road is used by visitors as well as local residents.

28. Approach the Provincial Government to maintain roadways in the vicinity of Lac La Nonne since roads are mainly used by visitors who do not reside in the area and the access roads pass through two municipalities.

29. Recommend that the County of Barrhead upgrade and supervise the method of solid waste disposal at the existing waste disposal site.

30. Encourage the County of Lac Ste. Anne to continue their investigation for an adequate solid waste disposal site (sanitary landfill site).

31. Identify an adequate site for disposal of septic sewage by pump out vehicle. This area should be a sufficient distance from the lake to prevent lake water pollution and groundwater contamination.

32. Ensure that operators of septic pump out vehicles be licenced through the appropriate Provincial authorities to maintain control over their activities and operations.

33. Maintain a regular inspection of existing septic systems to prevent odour and other problems, andenforce existing regulations regarding septic systems.

34. Recommend that legislation should prohibit pit toilets.

35. Recommend to the R.C.M.P. that they increase their patrols of the Lac La Nonne area.

36. Attempt to inform owners of vacant lots, municipalities who own public reserves, and users of both of these areas, that in most instances, an extreme fire hazard exists due to the accumulation of dead vegetation. More responsible maintenance and use of these areas by all involved is imperative. Weed control by-laws should be enforced. The possibility of establishing a local volunteer fire department should also be investigated.

Municipal Representation, Taxation, and Future Recreational and Residential Development

Questions and concerns raised in relation to these management issues were: owners of land at Lac La Nonne cannot vote in municipal elections unless they reside in the area; the local municipalities cannot adequately serve the residents and landowners at Lac La Nonne; taxes collected from local landowners are not used to improve the same area from which the taxes were collected; future recreational developments should be discouraged as there are adequate facilities provided by the existing developments; expansion of existing or creation of new recreational and residential areas should be undertaken carefully with special care paid to potential use conflicts; additional development should be prohibited until the existing vacant lots are occupied; more residential development will overpopulate the area; Lac La Nonne lacks sufficient commercial developments; the size of future commercial developments should be limited; and, clear definitions have to be developed between lot owner lake access and general public lake access and, residential land use and commercial land use.

Municipal Representation, Taxation, and Future Recreational and Residential Development Recommendations received from the public:

37. Recommend that a better system of property owner representation be developed to assist in responding to such matters as the lake management plan, taxation and other concerns affecting local property owners. The organization and formation of a property owners group or association is primarily their own responsibility.

38. Request that the local municipal councillor for the area meet on a yearly basis with the local landowners at Lac La Nonne so he could be in a much better position to fulfill his duties as an area representative.

39. Recommend that the local taxing authorities consider the establishment of a split mill rate based upon the project costs to maintain roads, other services and administration for the local area.

40. Recommend that the local taxing authorities not consider the establishment of a split mill rate as it only provides benefits to seasonal property owners and discriminates against permanent residents.

41. Consider the existing capacity of privately owned public serving recreational facilities before allowing additional areas to be developed.

42. Recommend a size limit on the development of new privately owned recreation areas.

43. Ensure that expansion of existing or establishment of new commercial recreation areas be kept a minimum of 1 kilometer from existing residential subdivisions. The converse (expansion of existing or establishment of new residential areas closer to existing commercial recreation areas) could, however, be considered. The rationale for this latter assumption is that the prospective buyer of a new lot located next to an existing commercial area, is aware that the facility exists and has the option of accepting or rejecting the situation by not buying the lot.

44. Recommend that the Provincial Government purchase land that is designated as a buffer between conflicting uses (such as commercial recreation and residential areas). This land could be designated a wildlife preserve to ensure that its use would be minimal.

45. Recommend that land purchased by the Provincial Government be priced in two stages, to ensure an equitable return to the private landowner. The first stage of payment would be based upon full market value at the time of purchase. The second stage of payment would be based upon 50% of full market value, five years after the first payment.

46. Recommend that development fees (paid by developers to the municipality at the time of subdivision) be used for improvements, within 5 years, in the same subdivision.

47. Recommend that in newly subdivided areas, the developer dedicate 10% of the total area being subdivided for garden plots. Also, make it the responsibility of the developer to install 6 inches of top soil in these areas.

48. Recommend that the taxing authorities improve the management of public reserves under their jurisdiction, especially in relation to weed control.

49. Recommend that general public areas be developed by the Provincial Government. Public reserves in newly subdivided areas should be designed for use by the owners of the adjacent lots.

50. Insure that existing and future residential subdivisions are developed for residential use only and not allowed to be developed for commercial ventures. Commercial development should not be allowed in residential subdivisions as use conflicts are created. Residential and commercial development should be clearly defined in the plan alternatives for Lac La Nonne.

Other Concerns and Recommendations

The remaining concerns focused upon: the number of people not contacted for surveys and public meetings; percentage of questionnaire returns; the role of the Edmonton Regional Planning Commission (E.R.P.C.); the relationship between the E.R.P.C. and the local municipalities; the different speed limits in the two rural municipalities; the development of a trailer park or subdivision within a former landing strip next to the Greendale subdivision; the dangerous use of the lake by sea planes; the existing controls on subdivision development and the legislation governing these controls; trespassing problems; and, the existence of sufficient public access at present.

Public recommendations arising from these discussions were:

51. Insure that future land use by-laws and other responsibilities conform all around the lake in the two rural municipalities.

52. Recommend that farming be phased out and the area be considered primarily as a recreational/residential area.

53. Recommend that lights be installed along Majeau Drive.

54. Recommend that the study area be expanded in the County of Barrhead to include N½ of 20-57-2-W5, and S½ of 1, 2, 3 and 4-58-2-W5. (This was a recommendation by the County of Barrhead.)

Conclusion

It is evident that upon examination of the foregoing recommendations, many conflicts or differences of opinion have been expressed (see recommendations 9 & 10, 17 & 18, 27 & 28, and 39 & 40 for examples). This is to be expected in the identification of issues affecting the future management of lake and land use at Lac La Nonne. From these various recommendations, in combination with biophysical, land use and socio-economic information, plan alternatives for Lac La Nonne will be developed and presented to the public and municipal councils in the near future. Alternative plans will be formulated as means of expressing the different opinions and ways in which plans can be developed for Lac La Nonne and its surrounding shoreland. From this process of issue identification and alternative plan formulation, it is expected that an acceptable lake management plan for Lac La Nonne will eventually evolve.

APPENDIX A Excerpts from Representative Briefs

"Taxing authority, in the case of the county, be required to establish a split mill rate to be set on the projected costs to maintain roads, administration, etc."

"Splitting the mill rate down the middle in favour of the cottage owners. I would agree this could be most satisfactory for the cottage owners, but where does this leave us residential owners (those of us who live here the year round). Does this mean then we would be left holding the bag and our taxes would be the only taxes supporting our areas. I do not agree that this would be too justifiable to us, there should be some other area or other ways to correct the situation if needed."

"Recreation. We are a community of our own at Lac La Nonne and having to use the facilities of Rich Valley is not very convenient nor very gratefying for we the people belonging to the area. Again, the help of the county in a grant to help us in bringing together our own community by putting up a community hall for our own use would be again a great help to us the people at Lac La Nonne.

"To better understand and know what is needed in the area. The councillor representing this or any area should call a meeting once a year, at least meet the people of the area and would be in a much better position to fulfill his duties towards his area of representation. If we are requested to pay taxes, then at least we should be given a chance to air our views and make them known to our representative."

"The creeks running to Lake Majeau and Nakamun should be cleared out to let the fish move back to the lake from the creeks. In many instances, the beaver have blocked free passage, or the water level drops and traps fish. Thousands of fish die every year, a far worse loss than commercial fishing."

"In regard to park and beach area for the general public (not owners of lots). May I point out that the government of Alberta owns nine quarter sections on the northwest of Lac la Nonne. Two of these quarters are lake front property which were designated public reserve at least forty years ago, but to this day, they have no access road so the public can use them. Surely pressure should be brought on the Provincial Government to establish a Provincial Park or at least a decent public campground for the general public."

"Set rigid controls on maintenance and operation of the commercial parks."

APPENDIX C

USER DAY CALCULATIONS - TABLE 15

User day is a standard measurement of use referring to the impact made by one user engaged in any activity at any time during one day, ie. a family of 4 at a cottage for 7 days, 4x7=28 user days.

The user day calculations shown on Table 15 have been primarily developed from questionnaire information and combined with additional information obtained from field surveys, personal communications and air photos.

Questionnaire respondents were asked to estimate the number of people per day at the lake (see question 10 of the landowner questionnaire in Appendix A). From the responses to this question, the number of user days were calculated by computer during questionnaire processing.

The number of user days calculated from the returned questionnaires are representative of the number of responses (53% return rate). In order to assess the impact of all land uses at Lac La Nonne, the user days calculated from the returned questionnaires were projected and applied to all lots and landowners at Lac La Nonne. The end result is Table 15 which outlines user days for existing development on: residential subdivisions; public reserves and access points; commercial recreation areas; institutional areas; and agricultural and natural land areas. In addition, an assessment of future impact in relation to vacant lots and planned development has been developed and included on Table 15.

Calculations

Calculations for Table 15 involved comparing the landowners questionnaire returns from Lac La Nonne with the questionnaire returns received from other lakes in the Edmonton Region. In total, six lakes were surveyed with approximately 2,300 questions being processed. This large number of returns assisted in making statistically valid assumptions regarding the number of user days at Lac La Nonne. As a result, the following figures were used to develop Table 15.

Land Use Categories	Total User Days Per Year	Seasonal Breakdown of User Days	
		Summer	Winter
1 resort cottage lot	287	68%	32%
1 country residential or rural acreage lot	1,168	52%	48%
1 commercial recreation site	218	97%	3%
1 farmstead (agricultural and natural land areas)	1,460	52%	48%

User days were also calculated for public reserve and access points and institutional areas. Based on field experience (three summer weekends and one weekend day during winter), the public at large appeared to be using only two public reserves for access. The user days shown on Table 15 are estimates based upon these field observations. Regarding institutional user days, representatives of the Roman Catholic and Anglican Churchs were interviewed to obtain estimates of existing and planned development.

User Day Relationships Between Land Use Categories

The calculations undertaken to produce Table 15 reveal some interesting relationships between resort cottage, permanent residential and commercial recreational impact. For example, the number of user days per year generated from 1 country residential lot are 4 times more than the number of user days generated from 1 resort cottage lot. Similarly, the user day impact of 1 country residential lot is more than 5 times higher than the annual impact of 1 commercial recreation site. The following matrix summarizes these relationships.

RATIOS OF USER DAY ANNUAL IMPACT

	1 Commercial Recreation Site (218)	1 Resort Cottage Lot (287)	1 Country Residential Lot (1,168)	1 Farmstead (1,460)
1 Commercial Recreation Site (218 user days)	1:1			
1 Resort Cottage Lot (287 user days)	1.3:1	1:1		
1 Country Residential Lot (1,168 user days)	5.4:1	4.1:1	1:1	
1 Farmstead (1,460 user days)	6.7:1	5.1:1	1.3:1	1:1

The above ratios assist in comparing the impact of different land uses and provide guidance when land use densities are allocated. For example, 1 country residential lot is considered equivalent to 4 commercial recreation sites. The above user day ratios assist in supporting this 1 to 4 density factor when the plan alternatives and the eventual final plans are formulated.

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